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# Significant factors in the adoption of electronic mail applications by foreign language educators

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**Significant factors in the adoption of electronic mail applications by foreign  
language educators**

**by**

**Janine Onffroy Shelley**

**A Dissertation Submitted to the  
Graduate Faculty in Partial Fulfillment of the  
Requirements for the Degree of  
DOCTOR OF PHILOSOPHY**

**Department: Curriculum and Instruction  
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**For the Graduate College**

**Iowa State University  
Ames Iowa**

**1995**

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DEDICATION

This manuscript is dedicated to my husband, Stephen DeWane Shelley, whose love, support, patience and encouragement have enabled me to accomplish goals I never dreamed possible.

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## GENERAL INTRODUCTION

Recent studies have described the challenge of effectively integrating computer-based technology into education as the schools race to keep up with a changing society (Thornberg, 1994, Clark, 1994, Papert, 1993, Sheingold, 1991). Although many educational programs are meeting that challenge, K-12 foreign language teachers have been more reticent to adopt computer-based technologies (Willis, 1993).

Computer use, however, does support second language acquisition (Herron & Moos, 1994; Armstrong & Yetter-Vassot, 1994). The use of computer networks have been proven effective in improving student reading, writing, and oral language production (Riel & Levin, 1990; Moore, 1991; Kern, in press; Beauvois, 1992). Instructing foreign language educators to use electronic mail could be a means to introduce them to valuable computer-based technologies.

This study describes the effects of a diffusion-based instructional model designed to encourage electronic mail use by foreign language educator. Results include a description of the factors that were significant in the adoption and use of electronic mail by K-12 foreign language teachers' adoption of electronic mail.

### Dissertation Organization

This dissertation was written in an alternate format that provides for the inclusion of papers to be submitted to a scholarly journal. It consists of three papers. The first paper, "Technology in Foreign Language Education: Potential Challenges and Possible Solutions," is a review of the research that focuses on the use of computer-based technology, specifically telecommunications in foreign language education. This study describes the role of technology in foreign language education, identifies factors that affect the adoption of

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electronic mail, and offers suggestions for developing an electronic mail in-service education program.

The second paper, "Factors that Affect the Adoption and Use of Electronic Mail by K-12 Foreign Language Educators," presents a quasi-experimental study that identifies factors that affected the adoption of electronic mail by K-12 foreign language teachers. Relevant factors include individual, school related, electronic mail, and education in-service characteristics.

The third paper, "Post-Institute Connections: Implementation and Outcomes of a Diffusion-Based Electronic Mail Instructional Model," offers a detailed description of an instructional model developed around Rogers' five characteristics of adoption. Three data sources are used to evaluate the effectiveness of the model.

References are located at the end of the General Introduction and at the end of each paper. Tables are included with the second paper; figures are included with the third paper. Materials included in the appendices will not be submitted to scholarly journals as part of the papers.

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**TECHNOLOGY IN FOREIGN LANGUAGE EDUCATION:  
POTENTIAL CHALLENGES AND POSSIBLE SOLUTIONS**

A paper to be submitted to the Modern Language Journal

Janine Onffroy Shelley

**Abstract**

Foreign language teachers have been slow to adopt computer-based technologies although technology can provide an arena for authentic learning situations for foreign language students. Because electronic mail is able to connect users from around the world and facilitate communication exchange, it serves as an excellent medium to promote technology use for foreign language educators. Adoption and implementation of a new technology demands change on the part of the adopter. This study presents the diffusion theory as a basis for change. Also described are electronic mail related characteristics that affect an individuals' adoption of the medium: adopter, electronic mail, network and organizational characteristics. This study concludes with several suggestions for developing effective electronic mail instruction: 1) make network access available, 2) provide experience with hardware and software, 3) develop effective in-service, 4) provide learning time, 5) anticipate teachers' perceived needs, 6) encourage administrative support, and 7) provide communication incentives.

## Introduction

Computer-based technologies have become a part of our daily lives. We find computers in our transportation, meal preparation, entertainment, and business transactions. Thornberg (1994) described the preponderant use of computer technologies by our population as an entrance into the Communication Age, an age evolving from the breakthroughs in compression and transmission of data. These breakthroughs allow data of all kinds to be sent at tremendous speeds making all data easily accessible to anyone anywhere.

Thornberg predicted that the Communication Age would change education and advised that it is the role of the educator to direct that change. Educators of this new age will have available a enormous amount of technology with which to enhance their lessons. Papert (1993) explained that information technologies, from television to computers, offer exceptional opportunities to improve the quality of learning. He also pointed out that these new technologies allow for the development of personal media that will support a variety of intellectual styles. However, Thornberg warned, "the presence of technology by itself is not an indicator of its effective use" (p. 22). Clark (1994) also stressed that, "Media and their attributes have important influence on the cost or speed of learning but only the use of adequate instructional methods will influence learning" (p. 27).

Because foreign language education is a discipline that focuses on communication in the target language and understanding of distant cultures, the technologies described by Thornberg (1994) could potentially support and improve foreign language education. Foreign language educators must prepare their students to be able to participate in a society whose contributions are based upon processing and transferring information. Today's foreign language

educator is fortunate because new technologies offer his/her students a variety of ways to interact with the target language and target culture.

Unfortunately most foreign language educators have been slow to adopt computer-based technologies (Herron & Moos, 1994; Willis, 1993). The process of their adoption of new technologies is not a simple one. First the foreign language teacher must perceive a need for the technologies, learn how to use the technologies, and finally be able to incorporate them successfully into their curricula so that the technologies will enhance student learning.

This study presents a description of the use of instructional and computer technologies in foreign language education, a discussion of foreign language educators' hesitancy to adopt computer technologies, a description of the diffusion theory as a basis for increasing foreign language educators' use of computer technologies, and suggestions for encouraging adoption of computer technologies by foreign language teachers.

### **Use Of Technology in Foreign Language Education**

#### ***Evolution of Foreign Language Methodology***

The study of foreign languages has been included in western civilization's education system for centuries. When sixteenth century French writer Rabelais (1936) described the education of fictional giant, Pantagruel, he included the mastery of a foreign language as part of an education to become the well-rounded, well-educated humanist man. At that time learning a language was considered a mental discipline that strengthened the power of the mind. This *Grammar-Translation Method*, translating the foreign language into the native language, and vice versa, was primarily used to teach students Greek and Latin so they could explore great literature written in those languages and



explain the structure of their own language. The Grammar-Translation Method was used well into this century.

Omaggio (1986) described Berlitz and Jespersen's *Direct Method*, developed in the nineteenth century, as learning language through direct association with words and phrases. Students learned to understand by listening to large quantities of language; they learned to speak by speaking, especially when speaking and listening were associated with definite actions. Advocates of this method believed that students who were exposed to language in large quantities were better able to understand it. Both the grammar-translation and direct methods were major influences on how foreign language was taught for the first half of the nineteenth century.

During the 1950's, at the time Skinner's behaviorist approach to education was flourishing, the *Audiolingual Method* became popular. Omaggio described this approach as a "marriage of structural linguistics and behaviorist psychology (that) resulted in a new theory of language learning which described the learning process in terms of conditioning" (p. 61). According to this method, language is primarily an oral phenomenon, and a study of recurring patterns to be memorized until they become automatic. This methodology involved the learning of a series of pattern drills taught initially without any grammar explanation.

The *Cognitive Approaches* that appeared in the 1960's stressed that learning must be meaningful and relate to students by taking into consideration their prior knowledge and experiences. Chastain's (1976) basic tenets of the *Cognitive Approach* were as follows: 1) students attain a minimal control over the rules of the target language so they are able to generate their own language, 2) the instructor must move from what the student knows to new knowledge,

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- 3) teaching materials and activities must promote a creative use of the language,
- 4) students should be taught the rule system rather than memorize in a rote manner,
- 5) students should understand what they are learning.

Omaggio described the three following approaches as evolving from the direct method: the Multiple Approach, Total Physical Response (TPR), and the Natural Approach. The *Multiple Approach*, developed by de Souza in the 1920's, focuses on the learner's individual characteristics. This approach advocates that adults and children do not learn a language in the same manner and therefore should be taught differently. Because this approach theorizes that language is generated in a manner particular to each individual speaker, it advocates avoiding pattern drills. This approach also stresses that all four language skills, speaking, oral comprehension, reading, and writing, should be taught at the same time. Asher's *Total Physical Response* method developed in the 1970's, asserts that oral comprehension should be developed fully before students are expected to speak (Asher, Kusudo, and de la Torre, 1970). This method also maintains that language skills are learned more quickly if the lesson appeals to the students' kinesthetic-sensory system. An instructor using this approach will use only the target language and many props and gestures to promote student comprehension and then eventually encourage student participation. The final approach of this trio, Terrell's (1977) *Natural Approach*, has students' achievement of intermediate proficiency in oral/aural skills as its focus with less emphasis on the structure of the language. Students' communicative competence and enrichment of vocabulary is considered more essential to language learning than students' knowledge of structure of the language. Terrell claimed that this approach is more effective because as students are exposed to the target language they are asked to acquire, rather than

learn about it. All of these three approaches revolve around creating a language learning experience that resembles a child's initial learning of a first language.

*Humanistic Education*, appearing since the 1970's, describes the various approaches to language learning which emphasize human interests. According to Omaggio (1986) these approaches are based on movements in psychotherapy, such as values clarification and sensitivity training, in which the affective development of the individual is the major concern. This approach concentrates on the individual's conscious and subconscious reaction to the language learning situation. The relaxed, motivated individual is more likely to successfully learn a language.

### *New Foreign Language Standards*

The shift in language learning theory now calls for more authentic communication in the language classroom (Goodman, 1986; Krashen, 1985; Taylor, 1981). The emphasis is no longer on learning about the structure of language, but rather on creating authentic language-learning situations that provide students with an opportunity to communicate in the target language and learn about the target culture. Content-based courses in which learners focus on subject matter taught in the foreign language are replacing grammar-oriented courses. (Binton, Snow & Wesche, 1989; Sternfeld, 1988). This trend evolved from the Cognitive Approach, the Multiple Approach, Total Physical Response, Natural Approach, and indirectly Humanistic Education.

The movement toward teaching communication in an authentic situation is clearly reflected in the new foreign language standards developed from input from foreign language teachers from around the country. The proficiency-oriented standards focus on outcomes, competencies, tasks, and

functions, The foreign language standards task force has identified five broad foreign language goals that will assist in completing the shift from language as the content of instruction to language as *access* to the content of instruction in order to support the total educational experience:

- 1) Communication in language other than English
- 2) Knowledge and understanding of other cultures
- 3) Connection with other disciplines and access to new information
- 4) Insight into own language and culture
- 5) Participation in multilingual communities and a global society

("National Standards," 1995)

The National Standards learning scenarios describe several lessons that use telecommunications as a medium for students to contact other students and retrieve information from the target country. It is evident, therefore, that technology, in this case telecommunications, can play a useful role in foreign language goals addressed in the National Standards.

### *Technology Use in the Foreign Language Classroom*

The adoption of the national standards will result in a change in curricula for many foreign language educators. That change will reflect a K-12 sequence of foreign language education, new forms of assessment, and integration of the use of computer-based technologies in the classroom. Sheingold (1991) identifies three agenda of general curriculum reform: an emerging consensus about learning and teaching, a movement toward well-integrated uses of technology, and the push for restructuring. With the development of new standards, foreign language educators are taking steps that meet Sheingold's first reform agenda by establishing an emerging consensus

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about learning and teaching a foreign language. Learning only about the structure of the language has been replaced by an emphasis on communication in the target language, understanding differences among cultures, and the importance of knowing a foreign language in a global community. Although the National Standards provide examples of the use of technology, Sheingold's second agenda has not been met. Foreign language teachers have not yet succeeded in integrating computer technologies into instruction (Herron & Moos, 1994).

Foreign language educators have been regular users of instructional technologies such as audio tapes, video tapes, overhead transparencies, films and slides. Armstrong and Yetter-Vassot (1994) argue computer-based technology's merits in foreign language education: "It is about encouraging students to leave behind the notion that learning means rote memorization. It is about exploration and the realization that there are multiple pathways to knowledge. It is about acknowledging that no one route is necessarily the best and that even apparent dead-ends may provide us with valuable information along the way" (p. 483). Yet, foreign language educators as a whole are not using computers with their students.

### *Language laboratories*

In the 1960s and 1970s the audio language laboratory, a first step to using technology for foreign language instruction, enabled students to listen to native speakers and to repeat and respond to them in the target language while the instructor listened at the console. The audio-lingual language lab activities were based on a stimulus-response behavior pattern that discouraged autonomous communication among students. Because of the language lab's

limited function, its dissemination of auditory input, and its tendency to inhibit creativity with the language, it is now being abandoned (Armstrong & Yetter-Vassot, 1994).

During the 1980s foreign language teachers began using video for classroom presentations to increase students' contact with the foreign language and culture. Many textbook series provided video series to accompany lessons in the text, and schools subscribed to satellite broadcasts provided by SCOLA, Francophone TV 5, and *Deutsche Welle*. These broadcasts were usually authentic transmissions prepared by and for native speakers. The use of video also made its way into language labs.

### *CALL and computer-based technologies*

Foreign language educators were first introduced to microcomputers with the use of computer-assisted language learning (CALL) software. CALL software provided teachers with a variety of applications including vocabulary, verb, and pronunciation tutors, electronic workbooks, spell checkers, word-processing packages, writing and reading tutors, as well as authoring programs that enabled instructors to create computer generated exercises to supplement existing courses. A criticism of the majority of CALL software is that it emphasizes the structural goals of the language rather than the communicative goals by providing fill-in-the-blank exercises that discourage natural language production by the learner (Armstrong & Yetter-Vassot, 1994).

More recent computer programs have been developed that combine CALL, video, and task-based activities to produce interactive fictional situations. Such a program, *A la rencontre de Philippe* (Furstenberg, 1993), a multimedia program integrating a computer and a laser disc, enlists the student's help to

find Philippe a new apartment in Paris. The student communicates with the program via the computer, while the laser disc offers the student a variety of audio and visual clues to complete his/her task. The U. S. Naval Academy has recently developed a computer template that can be used with a variety of videodisc programs such as *French in Action* (Capretz, 1993) that will create an interactive format for students with a minimum of programming by the instructor (Shughart, 1995).

Computer-based technology in foreign language education is moving toward using a medium that will provide learners with a more natural, authentic means to interact in the target language than was previously available. This is a positive step in the adoption of a content-based foreign language program, one which takes into account the interests and needs of learners, incorporates the eventual uses learners will make of the target language, and provides learners with the necessary conditions for social language acquisition by exposing them to meaningful language used in context (Binton et al., 1989). However, creating a realistic setting, or an opportunity to explore various language situations does not make a content-based activity. For a content-based learner-centered foreign language classroom to be successful, learners must be provided with opportunities to relate classroom experiences to long-term language goals. They should be able to choose their own topics of research and discussion and generate text which is later used in conversational or writing situations (Cononelos & Oliva, 1993). The use of telecommunications, a means of communicating with others, may also serve as an excellent medium in a content-based, communication-based foreign language classroom.

### *Electronic Mail and Foreign Language Education*

The majority of research in foreign language and technology to date has concentrated on CALL software. Recent literature, however, has also presented the use of computer networks as effective tools in the enhancement of language learning (e.g. Kern, in press; Beauvois, 1992; Munn & Kelton, 1993; Moore, 1991). Networks are a natural medium for language expression, whether that language is English or the target language. Networks provide students the opportunity to communicate with real people about real issues.

### *Description of CMC*

Computer-mediated communication (CMC) is "the process by which people create, exchange, and perceive information using networked telecommunications systems that facilitate encoding, transmitting, and decoding messages" (December, 1994, p. 1). The description of CMC includes information exchanged over a local area network (LAN), computers linked together in a computer lab or a wide area network (WAN), computers linked to a server that is linked to servers around the world. The Internet is a large wide area network. Communicative activities that can be carried out over a LAN or WAN include exchanging electronic mail, messages sent from one computer to another computer to be read at a later time; simultaneous "chat" where messages are exchanged in real time; and use of electronic bulletin boards, where all participant messages are posted for everyone to read. Access to a WAN will also provide access to listservs and newsgroups, and to other Internet resources. Computer-mediated communication has the power to unite users into a "virtual community," a group of users that share similar interests. (Reingold, 1993)



### *CMC Encourages Writing to a Real Audience*

The use of electronic mail has the potential for being a powerful teaching tool. When students use electronic mail they are able to potentially increase their communication skills in the target language (Golden, Beauclair & Sussman, 1992; Riel, 1991-92). This was also found to be the case in the foreign language classroom (Cononelos & Olivia, 1994; Beauvois, 1992; Kern, in press; Munn & Kelton, 1993). Several studies have described the results of students' message exchanges over a local area network (LAN) and over a wide area network (WAN) (Golden et al, 1992; Riel, 1991-92; Beauvois, 1992; Kern, in press; Munn & Kelton, 1993). In these studies it was found that students wrote more accurately in an authentic situation where they had the opportunity to write to a real audience (Moore, 1991; Riel, 1991-1992; Grennia, 1992). Messages written by students to be sent over a network to a real person, tended to have fewer mistakes (Riel, 1991-92) and ideas were more clearly stated (Moore, 1991) than those submitted to an instructor to be evaluated for grammatical errors. The intrinsic motivation of having a real audience seems to have a positive effect on improving students' grammar in the target language. Dvorak (1986) found that when students wrote to a real audience, real people about real issues, using grammar manuals as reference tools rather than primary textbooks, they also improved their grammar retention.

### *Use of Networks to Improve Foreign Language Skills*

Practicing communicative skills is a very high priority for K-12 foreign language educators (Wolf & Riorden, 1991). Communication in the target language has traditionally been considered an oral activity led by the teacher or

completed by students in small groups. Unfortunately it is often difficult to provide adequate time for each student to communicate during a typical class period. The use of telecommunications with foreign language students may be a solution to the problem of offering the student adequate opportunity to communicate.

When students write to a real audience they not only improve the quantity and quality of their writing (Riel 1991-92; Cononelos & Olivia; 1994) but also their oral language production. (Beauvois, 1992; Kern, in press; Munn & Kelton, 1993). Several recent studies on using Dadaeldus *InterChange* software with college foreign language students found that the students increased their quantity of language production, oral and written, and improved their general attitude about speaking the target language (Beauvois, 1992; Kern, in press; Munn & Kelton, 1993 ). The software allows two or more students in a conversation group to discuss over a computer network. The "conversation" for each group member is displayed on the screen with exchanges of the rest of the group in a "chat" or electronic bulletin board format.

Electronic mail offers foreign language teachers and students the opportunity to directly interact with members of the target culture or with other speakers of the target language in their classroom, within their classroom, country, and throughout the world.

### *Foreign Language Educators' Tendency to Avoid Technology*

Strong evidence has been presented on how the use of telecommunications and networks, by offering communication with a real audience, can enhance language production in the foreign language classroom;

but this does not explain why foreign language teachers are not using computer networks with their students (Cononelos & Olivia, 1994).

According to Willis (1992), computer technology, as a whole, has taken longer to enter the foreign language discipline, as well as other disciplines in the humanities, than the other content areas such as science or mathematics, although foreign language educators appear to be interested in the use of the computer applications. Willis explained that the weak adoption of computer applications exists because foreign language education is a *soft discipline*, such as English, art and other humanities courses; while science and math are *hard disciplines*. Because instructional computing staff come primarily from the hard disciplines, the lack of soft discipline role models and software programs results in the lack of computer activity in the soft disciplines. Foreign language educators, therefore, need to find effective methods to help them become more familiar with using computers.

An individual's experience using computers is significantly related to his/her confidence in using them and liking to use them, also defined as computer anxiety (Massoud, 1991). As early as 1985, Baylor found that some educators suffer from computer phobia, a negative attitude towards computers that originates from a negative attitude towards technology in general. In 1987, Mruk found that as teachers increase their self esteem as computer learners and overcome their anxiety they increase their competence.

Foreign language educators, therefore, need to participate in in-service programs or find other means that will provide them an opportunity to become comfortable using computer hardware and software. As they become more familiar with computers they may be more open to the use of computers in their classrooms.

### Diffusion Theory as a Basis for Change

It is clear that foreign language teachers as a profession are not using computer-based technologies as a tool in their classrooms. The diffusion theory offers insight into how to develop a program that will encourage their technology adoption. Introduction of computer-based technologies into the foreign language curriculum can be described as an innovation for foreign language educators.

A cycle of adoption occurs when new ideas, practices or objects are presented to a population. An individual, or group of individuals, goes through the adoption cycle when accepting or rejecting new ideas, practices or objects. Diffusion of innovations research has been done since the 1950s with studies in such varied fields as medicine, agriculture and education (Holloway, 1974). The knowledge of the perceived advantages and disadvantages of an innovation help researchers predict difficulties in adoption. In his major work on the diffusion of innovations, Rogers described *diffusion* as "the process by which an innovation is communicated through certain channels over time among the members of a social system" (1983, p. 5). He defined *innovation* as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption. " According to Rogers (1983), diffusion of an innovation through a social system is determined by the *perceived value* of the innovation and by the *characteristics of the adopters*.

There is an *innovation-decision process* that must also be taken into consideration with introduction of an innovation. It is a mental process which an individual must go through before adopting or rejecting the innovation. The steps of the process are: 1) knowledge of an innovation, 2) formation of an attitude toward the innovation, 3) decision to adopt or reject, 4) implementation

of the new idea, and 5) confirmation of the final decision (Rogers, 1986). This process can take time. According to Rogers (1986), the amount of time it takes for an individual to adopt an innovation varies according to the innovativeness of the individual.

### *Educational Change*

Between the 1960s and 1970s, research studies on educational change, evolving from the diffusion theory, appeared. Two research traditions, rural sociology and social psychology, contributed most to the study of the process of change in education (Rogers, 1983). These studies concentrated on identifying factors related to change, categorizing different change models, and the implementation of strategies (Fung, 1992). Issues of educational change included teaching methods, technology, roles and people, as well as organization and administration. Fung explained that all of the studies had one main objective: improving schools. At that time, however, more was known about why innovations failed than how to encourage implementation.

Hall and Hord (1987), whose first study on change was done in 1972, found that the process of implementing an innovation is as important as the attributes of the innovation itself. They explained that implementation of an innovation has a definite set of developmental stages and levels through which adopters must move to become more adept. They developed the Concerns-Based Adoption Model (CBAM) based on seven assumptions :

- 1) Understanding the point of view of participants in the change process is critical.
- 2) Change is a process, not an event.

- 3) It is possible to anticipate much that will occur during a change process.
- 4) Innovations come in all sizes and shapes.
- 5) Innovation and implementation are two sides of the change process coin.
- 6) To change something, someone has to change first.
- 7) Everyone can be a change facilitator (pp. 9-10).

These seven assumptions indicate that change has a human side as well as a technical side. Kuhlmann (1988) stated that an innovation's ability to facilitate an individual's needs from an objective point of view is less important than how the individual experiences the innovation. It is the individual's perceptions of the innovation and the way in which it affects him/her that will influence the response to the change. He also said that change is often a period of stress for those people involved. It is important to provide support and encouragement to make the change process a positive one.

Therefore, it is essential that foreign language teachers find their initial experiences with computer use a positive one. They should be exposed to the benefits of computer use in foreign language education and be given the opportunity to successfully interact with the medium. Change is not a random occurrence; it can be directed.

### *Perceived Value of the Innovation*

The use of computer-based technologies is an innovation for foreign language educators. Rogers (1983) stated that attributes or characteristics of an innovation, as perceived by the individual adopter, determine the innovation's rate of adoption by that adopter. He identified five characteristics or attributes

that influence the adoption of an innovation. Studies have also related Rogers' five characteristics to the adoption of educational innovations (e.g. Hall & Hord, 1987; and Hull & Wells, 1972). Hall and Hord's educational examples (p. 111) are included in brackets:

- 1) *Relative advantage*: The degree to which an innovation is perceived as being better than the idea it supersedes (p. 213). [Students demonstrate increased scores on standardized achievement tests.]
- 2) *Compatibility*: The degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of the receivers (p. 223). [The institution does not require the purchase of additional equipment or materials.]
- 3) *Complexity*: The degree to which an innovation is perceived as relatively difficult to understand and use (p. 230). [The new approach is not difficult to learn, not overly complex, and does not require new kinds of procedures or gadgets that require training to use them.]
- 4) *Trialability*: The degree to which an innovation may be experimented with on a limited basis (p. 231). [A volunteer teacher at any school could try a part of the innovation for a six-week period.]
- 5) *Observability*: The degree to which the results of an innovation are visible to others (p. 232). (Students and teachers are extremely pleased with how the new procedure is going.)

Relative advantage, compatibility, trialability, and observability have a positive relationship to the adoption of an innovation, while complexity has a negative relationship to such adoption (Rogers, 1983, Allan & Wolf, 1978, Holloway, 1974). Relative advantage has the strongest influence on adoption of an innovation, with compatibility also strongly affecting adoption (Rogers, 1983,

Holloway, 1974). The potential adopter's perceptions of innovations have been observed to be most effective predictors of an individual's level of innovativeness (Ostlund, 1974).

### *Characteristics of Adopters*

If the five above-mentioned characteristics of an innovation are held constant, it is the personal characteristics of the adopters, as opposed to the non-adopters, that determine whether or not the innovation is adopted (Holloway, 1974). Rogers (1983) has placed adopters/implementers into five adopter classes that represent the amount of time it takes for that individual to adopt an innovation. Innovators take the least amount of time to adopt, while laggards take the most amount of time to adopt. Members of each of the five classes possess certain characteristics described by Rogers (1983):

- 1) *Innovators*: individuals who are venturesome.
- 2) *Early adopters*: individuals who are respectable.
- 3) *Early majority*: individuals who are deliberate.
- 4) *Late majority*: individuals who are skeptical.
- 5) *Laggards*: individuals who are rational.

There are differences between earlier and later adopters of innovations in their socioeconomic status, their personality variables, and their communication behavior. Because of their high socioeconomic status, their outgoing personalities, and their leadership and social contacts, early adopters are often selected to promote a change in a population.

According to Rogers (1983), if an organization wants a certain group of people to adopt a particular innovation that organization should select a change agent, an individual who would influence clients' innovation decisions in a



direction deemed desirable by the organization, to influence the group's decision. The change agent, most likely not a member of that group, will then identify the opinion leaders, individuals who informally influence other individuals' attitudes in a desired way with relative frequency, to assist in the diffusion. Early adopters are often innovative, take risks, and have a positive attitude towards change. Because of their readiness to adopt and because of their tendency to be opinion leaders, early adopters are often sought out as targets by change agents who want to speed up the innovation process (Rogers, 1983). The following are characteristics of early adopters:

- 1) well educated
- 2) empathetic, less dogmatic, more favorable towards change, able to cope with uncertainty and risk, and motivated to achieve
- 3) social, exposed to interpersonal communication channels (Rogers, 1983).

### *Attributes of Communication Technologies*

Rogers (1986) has identified three attributes, specific to communication technologies, that are dependent on the presence and ingenuity of the adopter:

- 1) A critical mass of adopters of an interactive communication technology is necessary for the utility of the new idea to be sufficient for an individual to adopt. The more individuals who use the technology, the more who will adopt.
- 2) The adopter becomes involved with the innovation. Often there is a high degree of reinvention.

- 3) The focus falls upon the implementation and use of the technology rather than the decision to adopt, the decision to make full use of the innovation as the best course of action available (Rogers, 1986).

Roger's three attributes indicate that adoption of a communication innovation, such as use of electronic mail, involves more than the decision of an individual to use the technology. Because electronic mail is a communication technology, the individual needs an adequately large audience of other adopters, a "critical mass," with whom to communicate. The decision to use it is only the first step, it is the implementation of that technology, how the individual decides to use it, which determines success of the diffusion.

### *Introducing an Innovation to a Population*

When introducing an innovation to a population, it is important that all factors that enhance or obstruct adoption be identified and taken into consideration in the presentation of that innovation (Holloway, 1974). How the innovation is introduced to a population has an effect on its adoption. Innovations tend to fail because of the target population's fear of what is new. The complexity or difficulty of the innovation also discourages them from using it (Fung, 1992).

Most teachers are interested in using technology (Fulton, 1988), yet they still are not using computer-related technologies regularly in their classrooms (Marcinkiewicz & Grabowski, 1992). Adoption of computer-based technology by educators is more complex than just deciding whether to replace a calculator with a computer to calculate student grades. When teachers decide to use a computer with their students, it changes how they think, how students learn, how they assess students, and their relationships with students and other

teachers (Brunner, 1992). Because such a change involves the teachers' curriculum it may also involve an organizational change on the part of the school and/or school district. A school-wide change does not take place easily because it requires leadership, staff development, modification of the organizational structure, and involvement of administration, teachers, and staff from all aspects of the organizational structure (Fullan, 1991). Implementing technology education requires the educational institution to revise its philosophy, curriculum and instructional practices (Boser & Daughtery, 1994). The organization, not just the individual, must perceive the need for change before that change can take place.

#### **Elements that Affect the Adoption of Electronic Mail**

The use of networks could be an excellent source to introduce foreign language teachers to computer-based technologies because they present an opportunity for communication. Electronic mail exchange involves the use of a network. Electronic mail allows foreign language educators to maintain professional contact with each other, and provides a medium that offers students communication in an authentic situation. Adoption of electronic mail involves more than the decision of one individual. One must have a critical mass of other users with whom to communicate. Other characteristics that directly affect an individual's adoption of electronic mail appear to fall into four categories: 1) the adopter's characteristics, 2) the adopter's perceived value of electronic mail, 3) the characteristics of the network used by the adopter, and 4) the characteristics of adopter's organization.

### ***Adopter Characteristics***

Variables that predict computer use by teachers have been identified by Hiltz and Johnson (1990), who summarized previous studies on predictor variables that affect the acceptance of electronic mail. They found that predictors fell into three categories: strong, weak and fail to predict. The following are predictors for an individual's use of computers:

#### ***Strong predictors:***

- 1) Previous experience with computers
- 2) Attitude towards computers

#### ***Weaker predictors:***

- 1) Level of education
- 2) Innovativeness
- 3) Importance of task to be completed over the system

#### ***Characteristics that fail to predict:***

- 1) Typing speed
- 2) Attitude toward the group
- 3) Age

### ***Perceived Value of Electronic Mail Attributes***

An individual's perceptions of electronic mail and the process of using electronic mail will affect how s/he elect to use the medium, whether it be the hardware, the task, or the people involved (Golden et al, 1992). The following electronic mail characteristics were found to positively influence an individual's adoption of the medium. These characteristics would fall into Rogers (1983) category of *relative advantage* of electronic mail. Electronic mail:

- 1) Facilitates a task (Golden et al, 1992).

- 2) Links the user to an important person or organization (Golden et al, 1992).
- 3) Provides access to messages day, night or week-end hours (Hiltz & Johnson, 1990)
- 4) Is text-based (Ruberg & Sherman, 1992).
- 5) Is asynchronous (Ruberg & Sherman, 1992).
- 6) Is fast (Ruberg & Sherman, 1992).
- 7) Can be easily accessed by one or many (Ruberg & Sherman, 1992).
- 8) Offers a time lag before response (Ruberg & Sherman, 1992).
- 9) Reduces phone tag (Ruberg & Sherman, 1992).
- 10) Offers place independence (Harasim, 1990).
- 11) Offers interactions that are electronically revisable, achievable and retrievable (Harasim, 1990).
- 12) Is efficient (Sunal, Sunal, and Scheffler, 1993).
- 13) Offers valuable telecommunications experience for educators (Hamilton, 1990).

### *Network Characteristics*

The characteristics of the network, ease or difficulty in using the hardware ,and ease or difficulty of access to the computer represent Roger's (1983) *complexity* attribute, the degree to which an innovation is perceived as relatively difficult to understand and use. Obtaining an electronic mail account and learning to use the hardware and software to access electronic mail can be quite difficult for an individual. There are several obstacles to overcome to become proficient in using electronic mail:

- 1) Locating the necessary hardware (computer, modem) and software (Grabowski et al, 1990).
- 2) Locating a dedicated phone line or ethernet access (Grabowski et al, 1990).
- 3) Getting access to an on-line account and budget to pay for that account (Grabowski et al, 1990).
- 4) Finding time to learn how to use the hardware and software (Grabowski et al, 1990).
- 5) Obtaining technical service (Collis, 1993).

Hiltz and Johnson, 1990, found that the individual's ability to access to his/her own terminal, rather than a share a terminal, was a strong predictor for an individual's eventual use of electronic mail. She also found the type of terminal an individual used did not predict that individual's use of electronic mail.

### *Organization Characteristics*

"Communication technology" is not just hardware, it also includes the organizational structures and social values by which individuals collect, process, and exchange information with other individuals (Rogers, 1986).

Communication technology describes human interaction with machines and with other humans. A telecommunications network is a sociotechnical system that combines social and technical elements into a whole that is greater than the sum of its parts (Feenberg & Bellman, 1990). The potential support and working conditions of the adopter also have an effect on the adoption/implementation of electronic mail (Sunal et al, 1993). Several elements of a successful electronic mail experience are:

- 1) Administrators must be actively supportive. (Sunal et al, 1993)
- 2) Level of collegiality, trust, support, interaction, and open communication must exist among teachers (Sunal et al, 1993)
- 3) External assistance must be available when needed. (Sunal et al, 1993)
- 4) Pressure to use the system should be placed on the user. (Hiltz, 1990, Golden et al, 1992)

### **Suggestions for Promoting Electronic Mail Adoption**

The process of promoting electronic mail use by foreign language educators is not a simple one. Teachers' perceptions of electronic mail, their network characteristics, and support of their school administration must be taken into consideration. An effective electronic mail in-service program should take into consideration the following factors: availability of network access, experience with hardware and software, effective in-service design, learning time, attention to participants' perceived needs, administrative support, and communication incentives.

### ***Locate Network Access***

Several states have established state-wide networks that are available to educators: e.g. Texas (TENET), Florida (FIRN), Georgia (PEACHNET), New York (TNT), and Virginia (PEN). There is a variety of commercial service providers that, for an hourly or monthly fee, provide electronic mail and some or complete Internet access to anyone in the country who has a computer, modem, and phone line, such as America Online, CompuServe, Prodigy, and Delphi and many locally owned service providers. A large number of colleges and universities have their own networks that are used by students and faculty. School districts have begun to put telephones into classroom that could provide

electronic mail access to students and teachers. It can be said that network access is quickly becoming readily available to everyone who can afford it. Consequently, a critical mass of users is developing that will accelerate the adoption of electronic mail by educators everywhere.

### *Provide Experience with Hardware and Software*

As well as having easy access to a network, teachers must also find that the hardware and software are easy to handle in order for electronic mail to be effectively used (Riel, 1992). Accessing computer networks demands from the teacher a new body of technical and information retrieval skills that must be acquired before educators can use computer networks creatively with their students (Marantz & England, 1993). A problem consistent throughout our education system is that the majority of today's teachers have had little or no preparation in how to use computers in their teaching because they have no models to follow (Fulton, 1989). When the majority of today's K-12 teachers and college and university professors, were educated, computer technology was neither a part of the curriculum nor used by their instructors; although most recent pre-service teachers have the opportunity for computer in-service education (Peterson, 1989).

### *Develop Effective In-Service Education*

Development of effective in-service education is critical to teachers' adoption of the use of electronic mail in the classroom. Educational technologists are in an excellent position to act as external change agents to improve teaching with technology, through teacher in-service (Kenny, 1992). Effective in-service, however, is not easily developed. Fullan (1979, p. 3) proposes several reasons why most professional development fails:

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- 1) One-shot workshops are widespread but are ineffective.
- 2) Topics are frequently selected by people other than those for whom the in-service is intended.
- 3) In-service programs rarely address individual needs and concerns.
- 4) Follow-up support for ideas and practice introduced in in-service programs occurs in only a very small minority of cases.
- 5) Follow-up evaluation occurs infrequently.
- 6) The majority of programs involve teachers from many different schools and/or school districts, but there is no recognition of the differential impact of positive and negative factors within the systems to which they must return.
- 7) There is a profound lack of any conceptual bias in the planning and implementing of in-service programs that would ensure their effectiveness.

### *Account for Learning Time*

Preparing educators to incorporate computer technologies into their instruction takes time. Teachers need to develop confidence and control over technology before they are prepared to risk bringing it into their classrooms (Metcalf, 1989; Marantz & England, 1993). Achieving expertise in the use of the computer in the classroom takes time because it involves knowing how to use the equipment and how to design a lesson that effectively uses the technology. Sheingold & Hadley (1990) found that five to six years of experience were necessary before teachers felt they had a command of the technology, knew how to assess its usefulness, and how and when to use it in more than routine ways. Preskill (1988) recommended that teachers be given the time and the

opportunity to carry out the necessary experimentation required to learn to use computers. The opportunity to experiment would fall under Roger's (1983) attribute of *trialability*, the degree to which an innovation may be experimented with on a limited basis.

### *Account for Participants' Perceived Needs*

Because teachers must perceive a need for technology (Collis, 1993), in-service sessions should include an explanation of why technology is important (Brunner, 1992), as well as focus on the necessary skills to use technology (Werner, 1994). Unfortunately, too many computer-related in-service sessions are limited to improving the teachers' ability to use technology, paying very little attention to improving the teachers' attitudes toward it (Wedman, 1986). Improving such attitudes should be a major concentration in any technology in-service, since it is those attitudes which predict teachers' adoption behaviors (Madsen & Sebastiani, 1987). Teachers' feelings about using computers can range from uncertainty to hostility, from fear to euphoria, all of which will affect the eventual adoption (Chin & Hortin, 1993-94). As previously mentioned, Rogers' (1983) *relative advantage*, or perceived need, has the greatest effect on the adoption of an innovation. Rogers' (1983) research suggests that teachers who feel they need to adopt electronic mail will be more likely to overcome obstacles such as obtaining an electronic mail account and locating a dedicated phone line that might otherwise prevent them from becoming electronic mail users. It is important that electronic mail in-service education concentrate on increasing teachers motivation to use it.

### *Encourage Administrative Support*

A supportive administration is a key factor in a successful technology in-service program (Chin & Hortin, 1993-94; Russell, Sorge & Brickner, 1994; Paul, 1994) . Teachers and administrators should jointly develop a technology plan for their institution (Preskill, 1988). A well-designed in-service education program is one that includes in its preparation administrators responsible for curriculum, budget, staff development, testing and evaluation and instruction; a technology coordinator; and teachers (Chin & Hortin, 1993-94). Chin & Hortin describe the best in-service education programs as being planned and carried out with teacher input from the beginning, and with administrators and supervisors in leadership roles giving inspiration and support. Administrators are able to give teachers network access, equipment, and time required for experimentation with electronic mail.

### *Create Communication Incentives*

The majority of the literature on electronic mail in-service education recommends that participants, whether teachers or students, be placed in working pairs or groups to provide individuals with an audience for their correspondence (Moore, 1991; Riel, 1992; 1991-92; Kern, in press; Cononelos, 1993; Beauvois, 1992; Levin et al, 1989). Riel & Levin (1990) found that in successful electronic mail in-service programs, participants should have a shared goal or outcome, such as a final report prepared using the network. The required project would provide pressure for them to use the network. They found that groups that existed previously had better chances of survival and success than groups formed specifically to use the technology.

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When encouraging foreign language educators to adopt electronic mail the hardware and software should be made available, they should be given the opportunity to experiment with the medium, they must be given time to adopt it, and they must have school support. An effective in-service program must take into consideration the foreign language curriculum and specific needs of foreign language teachers. It must also provide follow-up opportunities and incentives for participants to use electronic mail.

### Conclusions

Use of computer-based technologies have been accepted into foreign language education at a slower pace than with many other disciplines. Yet computer-based technology can be a powerful teaching medium. Adoption of computer-based technologies by foreign language educators requires change by those teachers. Whether or not an individual makes the change involves his/her perceptions of the innovation as well as personal characteristics. It is important that the foreign language teachers perceive a need for the new technology, find it compatible with course objectives, have the opportunity to experiment with it, receive some assistance with its difficulties, and find it somewhat prestigious to use.

The use of computer networks, specifically the exchange of electronic mail, could be the medium that motivates foreign language educators to use computers because of its facilitation of communication. Electronic mail use has a positive affect on student motivation and on the oral and written proficiency of foreign language students in particular because it gives them an opportunity to communicate in the target language to a real audience.

Development of an in-service program to introduce foreign language teachers to electronic mail, its use in foreign language education, and provide them with the opportunity to experiment with the medium would be effective in introducing them to computer-based technologies. Teachers' personal characteristics, network characteristics, and characteristics of the their institutions must be addressed in the in-service session. A final product that would require in-service participants to use electronic mail is highly recommended.

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**FACTORS THAT AFFECT THE ADOPTION AND USE OF ELECTRONIC MAIL  
BY K-12 FOREIGN LANGUAGE EDUCATORS<sup>1</sup>**

A paper to be submitted to Educational Technology Research and Development

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**Abstract**

This study describes the results of electronic mail instruction of K-12 educators who participated in four 1994 summer foreign language workshops. The instructional design was developed using Rogers' diffusion theory to promote the adoption of electronic mail by workshop participants. The outcomes of the study indicate that diffusion-based instruction was successful in promoting the adoption of electronic mail participants. Also reinforced was the importance of the five characteristics of adoption in an individual's use of an innovation.

Significantly more workshop participants were using electronic mail than non-participants. Three major predictors of electronic mail use were 1) participation 5-6 hours of in the foreign language workshop electronic mail instruction, 2) contact with teachers outside of the teacher's school district, and 3) the support teachers receive from their school/administrators in using

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technology. Also identified in this study are factors that foreign language teachers found significant in their adoption of electronic mail.

### **Introduction**

Our society is in the process of change as it evolves from an Industrial Society of standardized products and assembly-line production to an Information Society that recognizes the individuality of its members (Rogers, 1986). Thornberg (1994) described the United States as having just entered the Communication Age, built on advances of the Information Age, evolving from the breakthroughs in compression and transmission of data that allow easy access to data by anyone anywhere. Thornberg predicts that education will change as a result of the Communication Age, necessitating the preparation of educators to direct that change. Sheingold (1991) suggests that the changes in education will involve extensive curriculum reform that will have as its core three agenda: 1) an emerging consensus about learning and teaching, 2) a movement toward well-integrated uses of technology, and 3) the push for restructuring.

Foreign language education is reflecting the changes described by Rogers and Thornberg. During the past twenty years there has been a transition in language learning theory from an emphasis on grammar structure to authentic communication in the foreign language classroom. This movement is evident in the new proficiency-oriented standards for foreign language education currently being developed collaboratively by the American Council on the Teaching of Foreign Languages (ACTFL), the American Association of Teachers of French (AATF), the American Association of Teachers of German (AATG), and the American Association of Teachers of Spanish and Portuguese (AATSP).

The standards identify five broad foreign language goals that will serve as a transition to complete the shift from language as content of instruction to language as *access* to content of instruction:

- 1) Communication in language other than English
  - 2) Knowledge and understanding of other cultures
  - 3) Connection with other disciplines and access to new information
  - 4) Insight into own language and culture
  - 5) Participation in multilingual communities and a global society
- ("National Standards," 1995)

Development of new foreign language standards meets Sheingold's first agenda, a new consensus about learning and teaching. Introducing new technologies into the foreign language curriculum could meet both Sheingold's second and third agenda, integrated uses of technologies and a push for restructuring. Foreign language teachers have been regular users of instructional technologies such as audio and video tapes, films and slides, and various realia; but they have been slow in integrating computer technologies into their instruction (Herron & Moos, 1993, Willis, 1992).

Technology introduced into the educational curriculum can act as a catalyst for change (Sandholtz, Ringstaff & Dwyer, 1991). Further, the use of electronic mail, whether over a local area network (LAN) or wide area network (WAN) has tremendous potential for enhancing the foreign language curriculum.

### *Electronic Mail Use in Foreign Language Education*

Studies have shown that when students use electronic mail in classroom activities they increase their language skills (Golden, Beauclair & Sussman,

1992; Riel, 1991-92). Students tend to write more accurately when they have the opportunity to communicate with an authentic audience (Moore, 1991; Riel, 1991-92; Grennia, 1992). They tend to make fewer grammatical mistakes (Riel, 1991-92) and state their ideas more clearly (Moore, 1991) than when they write an assignment to be evaluated by a teacher.

Wolf and Riorden's (1991) study verified that foreign language teachers emphasize practicing communicative skills in the target language. Although communication in the target language has traditionally been considered an oral activity led by the teacher or done by students in small groups, several recent studies indicate that using Dadaeldus *Interchange* software in a networked lab increases students' oral production as well as written production (Beauvois, 1992; Kern (in press); Munn & Kelton, 1993).

### *Adoption and Diffusion of Electronic Mail*

Strong evidence has been presented on how the use of networks, specifically electronic mail exchange, is able to enhance students' language production, but it does not explain why foreign language teachers as a whole are not regularly using computer networks with their students (Cononelos & Olivia, 1994; Shelley, 1995-a). Because the use of electronic mail and networks are relative new to educators, it can be considered an innovation. Rogers (1983) describes an innovation as ideas, practices or objects perceived as new by individuals. He found that the adoption of an innovation is a process determined by the "perceived "value of the innovation and by the "characteristics of the adopters." Rogers defined the steps of that process as: 1) first knowledge of an innovation, 2) formation of an attitude toward the



innovation, 3) decision to adopt or reject the innovation, 4) implementation of the innovation, 5) confirmation of the final decision (1986).

Rogers (1983) found that an individual's perceptions of an innovation, the way it affects him/her, are more important in its adoption than the innovation's ability to facilitate the individual's needs. Rogers (1983) identified five characteristics that influence an individual's perception of an innovation, and therefore the adoption of that innovation:

- 1) *Relative advantage*: The degree to which an innovation is perceived as being better than the idea it supersedes (p. 213).
- 2) *Compatibility*: The degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of the receivers (p. 223).
- 3) *Complexity*: The degree to which an innovation is perceived as relatively difficult to understand and use (p. 230).
- 4) *Trialability*: The degree to which an innovation may be experimented with on a limited basis (p. 231).
- 5) *Observability*: The degree to which the results of an innovation are visible to others (p. 232).

Rogers (1983) also identified five categories, based on the characteristics of the adopter, that describe the amount of time it takes an individual to adopt, the innovators being the quickest adopters and the laggards the slowest:

- 1) *innovators*: individuals who are venturesome.
- 2) *early adopters*: individuals who are respectable.
- 3) *early majority*: individuals who are deliberate.
- 4) *late majority*: individuals who are skeptical.
- 5) *laggards*: individuals who are rational.

### ***Factors that Affect Adoption of Electronic Mail***

In 1990, Hiltz and Johnson recommended that "interactive computer systems should be viewed as 'socio-technical' systems whose acceptance is influenced by an interaction among characteristics of the individual users, the groups and organizations in which they are implemented, and the computer systems themselves" (p. 739). Their study examined electronic mail characteristics, adopter characteristics, and organizational characteristics that affect K-12 foreign language educators' adoption of electronic mail, as well as the effect of in-service education on their adoption.

#### ***Adopter Characteristics***

Hamilton (1990) identified characteristics of "early adopters," students and educators who were most likely to adopt electronic mail over a bulletin board system (BBS). Early adopters were more likely to possess an advanced degree, have a personal income of \$30,000 or more, were approximately 39 years old, had 11 or more years of teaching experience, frequently contacted teachers outside of school, had a positive attitude towards technology, and a positive attitude towards risk.

Hiltz & Johnson (1990) identified two strong predictors that affect the individual's acceptance of electronic mail: previous experience with computers and attitude towards computers. They identified the following as weaker predictors: an individual's education, his/her innovativeness, and the importance of the task to be completed over the system.

#### ***Electronic Mail Characteristics***

Several studies suggest that electronic mail characteristics affect its adoption. Golden et al (1992) reported that electronic mail's potential to

facilitate a task and link users to an important person or organization motivated its use. Ruburg & Sherman (1992) identified the following attributes of electronic mail as encouraging its use: it is text based, fast, can be easily accessed by one or many, offers a time lag before response, is asynchronous (written at one time, read at another), and reduces phone tag. Other important electronic mail characteristics that positively affect use are: it provides access to messages day, night or week-end hours (Hiltz & Johnson, 1990), offers interactions that are electronically revisable, achievable and retrievable (Harasim, 1990), is efficient (Sunal, Sunal, & Scheffler, 1993), and offers valuable telecommunications experience for educators (Hamilton, 1990).

#### *Organizational Characteristics*

Sunal et al (1993) found that an individual's working conditions have a definite effect on his/her adoption of electronic mail. They identified the following organizational characteristics as affecting the individual's adoption of electronic mail: the school principal must be actively supportive; teachers must have a level of collegiality, trust, support, interaction, and open communication; and external assistance must be available when needed. Hiltz and Johnson (1990) and Golden et al (1992) also suggested that a degree of pressure placed on the user, or an incentive to use the system, could also increase adoption.

#### *In-Service Education Characteristics*

In-service education is essential in preparing teachers to use technology in the classroom. Technology in-service education, however, should not be limited to merely instruction of skills, but should reflect the teacher's curriculum focus and work environment (Chin & Hortin, 1993). Too many

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computer-related in-service education sessions are limited to improving the teachers' ability to use technology, paying very little attention to improving the teachers' attitudes toward it (Wedman, 1986). Improving such attitudes should be a major emphasis in any technology instruction, since it is those attitudes which predict teachers' adoption behaviors. (Madsen & Sebastiani, 1987).

Teacher resistance to change should be recognized when designing electronic mail instruction, and steps should be taken to encourage teachers to use electronic mail. Riel & Levin (1990) recommend that the following elements should be included in the design of electronic mail instruction: there should be an end product required from the participant, or participant's group, such as a report or project; regular patterns of mail access must be encouraged; and a facilitator should be available to assure that participants stay on task, and to evaluate the final product.

### *Summary*

Foreign language teachers' use of electronic mail is able to enhance language students' communication skills. Computer technologies, however, are not rapidly being adopted by foreign language educators. Preparing foreign language educators to use computer technologies, such as electronic mail, should be effective in their eventual adoption of electronic mail. When introducing electronic mail to foreign language educators it is important that the instruction reflect the foreign language curriculum and that teachers perceive a need to use electronic mail.

This study is divided into two distinct parts. Part I presents a discussion of the effects of electronic mail instruction on the use of electronic mail by K-12 foreign language educators, while Part II identifies factors that affect and predict

electronic mail use. Both sections are preceded by a common methodology section that describes the subjects and instruments involved in the study. Each section has its own description of dependent and independent measures and of results. The final discussion combines the findings from both parts.

### **Common Methodology**

#### *Subjects*

The subjects for this study, foreign language teachers who returned the research questionnaire made up the experimental and control groups. The experimental, participants, group consisted of 64 K-12 foreign language teachers who participated in one of four foreign language summer workshops held at a large midwestern university in 1994. The control group, non-participants, consisted of 64 foreign language teachers who applied to attend the four workshops, but who were not selected and therefore did not receive the electronic mail instruction.

There were 357 applicants who applied for 86 workshop openings. The final selection of workshop participants represented 36 of 50 states and ten languages: Chinese, French, German, Hebrew, Japanese, Latin, Quechua, Romanian, Russian, and Spanish (Rosenbusch, 1994). Because the final selection was intended to represent a broad geographical, language, and teaching level distribution, many very qualified applicants were not selected.

The sample of non-participants to receive questionnaires was selected from among the applicants to the institutes because they received high scores on the application evaluation instrument, as did the workshop participants; but due to distribution qualifications were not selected. Scores on application evaluations of both participants and non-participants fell between 25 and 35, out

**Table 1: Chi-Square Test of Homogeneity of Characteristics of Workshop Participants and Non-Participants**

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
GENDER	64			64		
Female		54	84.38		52	81.25
Male		10	15.63		12	18.75
$\chi^2=.05$ p=.81						
EDUCATION	64			64		
BA/BS		12	18.75		16	25.00
MA/MS		46	71.88		44	68.75
PHD/EdD		6	9.38		4	6.25
$\chi^2=1.02$ p=.60						
AGE DISTRIBUTION	64			62 <sup>1</sup>		
20-39		19	29.69		13	20.97
40-49		29	45.31		30	48.39
50-over		16	25.00		19	30.65
$\chi^2=1.38$ p=.50						
YEARS OF TEACHING	64			64		
1-5		5	7.81		5	7.81
6-10		8	12.50		9	14.06
11-15		12	18.75		6	9.38
16-20		16	25.00		21	32.81
21-25		13	20.31		10	15.62
26- and over		10	15.63		13	20.31
$\chi^2=3.351$ p=.62						
TEACH ASSIGNMENT	64			64		
Elementary		14	21.88		9	14.06
Middle school/ jr. high		8	12.50		10	15.63
High School		28	43.75		35	54.69
Other		14	21.88		10	15.63
$\chi^2=2.75$ p=.43						
LANGUAGE TAUGHT	64			64		
French		21	32.81		23	35.94
Spanish		28	43.75		32	50.00
Other		15	23.44		9	14.06
$\chi^2=1.86$ p=.40						

N = number of respondents  
Freq. = number of responses  
% = percent of all responses

<sup>1</sup>note that 2 subjects did not respond to this question

of 35 possible points, for the non-technology workshops; and between 25 and 40, out of 40 possible points, for the technology workshops. The evaluation form used to evaluate workshop applications included the following categories: 1) evidence of involvement and commitment to teaching a foreign language, 2) potential to impact foreign language education (intention and potential to share knowledge, evidence of leadership in foreign language education), 3) evidence of language ability/background, 4) evidence of excellence in teaching, and 5) strength of references. For the technology workshops there was a final category, the level of use of technology. Each application was evaluated by a minimum of two raters.

A chi-square test performed on participants' and non-participants' gender, education, age, and years of teaching showed that the two groups were independent (Table 1). Borg and Gall (1989) recommended that the chi-square test be used to determine whether two frequency distributions differ significantly from each other. According to Borg and Gall, the chi-square test is most often used with, but not limited to, categories that are discrete, not

**Table 2: *T-test on CAIN and IS Scores of Workshop Participants and Non-Participants***

Category	N	M	S.D	t	p
10 item IS, participants	64	18.08	6.06	-1.34	.18
10 item IS, non-participants	62	19.69	7.46		
20 item CAIN, participants	63	29.22	10.31	-.70	.24
20 item CAIN, non-participants	63	30.61	12.05		
M = mean					
SD = standard deviation					
t = t value					
p = probability					

continuous. The chi-square test indicated that characteristics of participants and non-participants were the same. The majority of teachers surveyed were women, at least 40 years old, who had earned an M.A. or higher degree, and who had taught 11 or more years at the high school, junior high or middle school, or elementary levels. In both groups, the majority of teachers taught Spanish or French.

A t-test was performed to determine if there was a difference in computer anxiety and risk-taking levels between participants and non-participants. No significant difference between the two groups was found for computer anxiety or risk-taking (Table 2). The Computer Anxiety Index (CAIN) (Simonson, Maurer, & Torardi-Montag, 1987) and Innovativeness Scale (IS) (Hurt, Joseph, & Cook, 1977) were the instruments used to obtain a computer anxiety score and a risk-taking score.

### *Instrumentation*

#### *Questionnaires*

Two self-report questionnaires were developed by the researcher based on the objectives of the research: 1) determining the effect of workshop electronic mail instruction on its adoption by K-12 foreign language teachers and 2) identifying factors that affect the adoption of electronic mail. Information was gathered in the following areas:

- 1) background information to establish the teachers' electronic mail adoption levels;
  - 2) support of computer-related technologies by colleagues, school and administration;
  - 3) amount of electronic mail instruction subjects had received;
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- 4) level of subjects' electronic mail use;
- 5) characteristics of electronic mail users among subjects;
- 6) electronic mail characteristics significant in subjects' adoption of electronic mail;
- 7) workshop characteristics significant in subjects' adoption of electronic mail;
- 8) subjects' computer anxiety level;
- 9) subjects' risk-taking level.

Substantial research was involved in creating the questionnaire. Items to be included were determined through research in diffusion of innovations and electronic mail use. Input in content and style of the questionnaire was made by three educators who had considerable experience in questionnaire development. Before mailing the questionnaires to research subjects, the instruments were piloted by a group of secondary foreign language teachers comparable to the research subjects and education graduate students, and then revised. Internal consistency measure of reliability was calculated for the CAIN,  $\alpha=.92$ , which measured subjects' attitudes towards computers, and the IS,  $\alpha=.84$ , which measured subjects' tendency towards risk-taking.

Participants were mailed a 100-item version of the questionnaire, "Survey of Technology and Electronic Mail Use by National K-12 Foreign Language Resource Center Institute Participants." Non-participants received a modified 88-item version of the questionnaire, "Survey of Technology and Electronic Mail Use by Foreign Language Educators," that was identical to the instrument received by participants, but did not include 12 questions relating specifically to foreign language workshop electronic mail instruction.

Both questionnaires were divided into four sections: 1) background information, 2) attitudes towards computer-related technologies, 3) use and potential use of computer technology, and 4) influence of electronic mail characteristics that affect the use of electronic mail by foreign language educators.

### ***Background Information***

The 15 questions in this section were based on Hamilton's (1990) questionnaire, *User Survey for the Electronic Educational Exchange*. Questionnaire items included teachers' background information that also established their adopter level that included gender, education, age, experience, teaching assignment, and language taught (see Table 1). A seventh question in this section determined how long subjects had been using a computer, with responses that ranged from "I don't use a computer" to "more than 7 years." A second division of this section included eight questions that dealt with the teachers' amount of contact with other teachers inside and outside the school district (four items), and use of instructional technology (three items), and their use of computer technology (one item). The choice of responses to these questions ranged from "15 or more times per semester" to "never."

### ***Attitude Toward Computer-Related Technologies***

This portion of the questionnaire consisted of a 20-item abbreviated version of the CAIN used to evaluate participants' and non-participants' computer anxiety level and the 10-item reduced version of the IS to evaluate participants' and non-participants' risk-taking aptitude. The two scales were combined in the instrument, but separated for evaluation.

### *Use and Potential Use of Computer Technology*

The group of questions in this section were researcher-developed and based on diffusion research to determine which factors contribute to the individual's adoption of electronic mail. This portion of the questionnaire identified the extent of teachers' school/administration support, amount of electronic mail instruction received, and amount of electronic mail use. School support was determined using a statement such as "The use of computer related technologies by teachers is a high priority at my school" that subjects rated on a Likert-type scale from "strongly agree" to "strongly disagree." The amount of electronic mail instruction ranged from "no formal training " to "13 or more hours" (see Table 7). It should be noted that participants were given the choice of "5-6 hours" through "13 or more hours" since all had received that amount of instruction during workshops. Subjects' "present status" of electronic mail use was determined by seven choices that ranged from "I know nothing about electronic mail" through "I use and will continue to use electronic mail" (see Table 5). Subjects also answered the question "I have access to an electronic mail account" with "yes" or "no." Individuals who answered "no" to the last question were informed that they had finished the questionnaire at that point. Individuals who answered "yes" to the "electronic mail access" question were requested to continue filling out the remainder of the questionnaire.

The final portion of the questionnaire was answered *only* by subjects who indicated that they had access to an electronic mail account. Three questions covered the length of time teachers had an electronic mail account (see Table 3), their service provider, and the amount of messages they sent a week (see Table 6). A remaining nine questions determined the individual's type of access: who pays for the account, where the account was accessed, use of listservs,

newsgroups and the Internet, and use with students. Statements such as "I personally pay for my electronic mail account" were answered by "yes" or "no."

*Influence of Electronic Mail Characteristics that Affect the Use of  
Electronic Mail by Foreign Language Educators*

Elements for this portion of the questionnaire were researcher-developed founded on diffusion-based research on factors that promote the adoption of electronic mail. It is in this section that the questionnaires sent to participants and non-participants differ. Both participants and non-participants were requested to rate nineteen electronic mail characteristics, such as "The ability to contact someone who is otherwise difficult to reach," as to their significance in their adoption of electronic mail. They were given a Likert-type scale with choices that ranged from "extremely significant" to "not at all significant."

Workshop participants were given 12 additional characteristics, based on the instruction they received in the workshop, such as "The opportunity to have electronic mail training led by a foreign language educator." Non-participants did not answer these 12 questions.

*Common Procedures*

*Distribution and Return of Questionnaires*

Nine months following the first workshop, and seven months following the last, the 100-item questionnaire was mailed to the 77 K-12 participants. Nine university professors who attended one of the workshops were not included in this study because a comparable control group did not exist among the remaining applicants. An 88-item questionnaire was sent to 82 institute applicants who did not participate in the workshops, but who had received high

scores on the application evaluation forms. Of the 77 participants, 64 (83%) returned their questionnaires, and of the 82 non-participants, 64 (78%) returned their questionnaires. To achieve the 78% return by non-participants, a second copy of the questionnaire was sent to those who failed to return the first one. Since the participant return rate was 83%, a second letter was not mailed to them.

### *Electronic Mail Instruction of Foreign Language Workshop Participants*

Seventy-seven K-12 foreign language teachers and nine university foreign language methods professors participated in four summer workshops on a large midwestern university campus. Two of the workshops were curriculum oriented. The first workshop, ten days long, dealt specifically with developing collaboration among university methods professors and K-6 foreign language teachers. The second, lasting five days, was attended by K-12 teachers interested in foreign language curriculum development. The two remaining workshops, both lasting five days, were technology oriented. One concentrated on new technologies available for foreign language education and the other, on the development and use of interactive multimedia.

During each workshop participants were given five to six hours of electronic mail instruction extending over two or three days to encourage their continued correspondence with each other to facilitate completion of post-workshop projects. Electronic mail instruction was performed by the researcher, a foreign language educator with an instructional technology background. Participants were first given an hour-long introduction to electronic mail and telecommunications where they were presented some of the research on the use

of electronic mail to enhance language production. Included in the general introduction was a short explanation of the use of the Internet in education.

Computer hands-on time, an average of four hours, was spent in a networked Macintosh computer lab with an ethernet connection to the university's electronic mail server. In most cases each participant had access to a computer; however, in two workshops two to four participants were required to share machines during each session. Each participant was assigned a personal university electronic mail account for the duration of the workshop. The session began with basic instructions on how to turn on the computer and access the electronic mail. Participants were then taught how to send, read, copy, and forward electronic mail on a menu-driven UNIX system. They spent the remainder of their time completing an electronic mail activity that required them to work cooperatively in groups of three to four to gather and process information from workshop members using only electronic mail to communicate with each other. This activity was designed to model the type of communication they would use as they completed their post-workshop collaborative projects. The activity could also be adapted for use with students.

The electronic mail instruction was concluded with the guidelines for post-workshop projects and discussion of software and hardware necessary to access electronic mail at home and at school. Participants in three of the four workshops received complementary copies of America Online software. Selection of projects and formation of small groups occurred at another session.

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## **Part I: Effect of Electronic Mail Instruction on the Use of Electronic Mail by Participants and Non-Participants**

### ***Methodology: Design***

This first portion of the study used a quasi-experimental non-equivalent participants/ non-participants design that compared workshop participants' adoption of electronic mail with that of non-participants. The number of teachers who had electronic mail accounts prior to workshop electronic mail instruction, or 8 to 10 months before receiving the questionnaire, was compared with the number of teachers who had access to and used electronic mail accounts at the time the questionnaire was completed.

### ***Dependent Measures***

In this portion of the study there were three dependent measures: 1) the number of subjects using electronic mail, 2) the length of time teachers had access to electronic mail, and 3) the number of electronic mail messages teachers sent.

### ***Number of Subjects Using Electronic Mail***

Two questionnaire items established whether or not subjects used electronic mail. The first item was "I have access to an electronic mail account" which could be answered by "yes" or "no" (see Table 3). The second item established the level of the subjects' knowledge about and use of electronic mail by offering seven choices:

- 1) I know nothing about electronic mail.
- 2) I know about electronic mail, but lack complete information.
- 3) I am interested in electronic mail, but lack complete information.

- 4) I have evaluated the use of electronic mail and have decided it will work for me, but have not had the opportunity to use it.
- 5) I have evaluated the use of electronic mail and have decided it will not work for me.
- 6) I have tried using electronic mail. (Any attempt is counted as a trial).
- 7) I use and will continue to use electronic mail.

### *Length of Time of Electronic Mail Access*

The length of time of electronic mail access was determined by one question: "I have had my account for" with six response choices ranging from "less than a month" through "over a year" (see Table 4).

### *Number of Messages Sent*

The extent of the subject's level of electronic mail use was determined by one question: "In an average week I send the following number of messages." The respondent had seven choices ranging from "I have an electronic mail address but do not send messages regularly " to more than 10 messages a week" (see Table 6).

### *Independent Measures*

There were two independent measures in this portion of the study: 1) the number of hours of electronic mail instruction each teacher had, and 2) whether or not the teacher had participated in the workshop electronic mail in-service education.

### *Amount of Electronic Mail Instruction*

The amount of any electronic mail instruction each subject had received was determined with one question: " Please indicate the number of hours of



formal electronic mail training you have had over the past two years. (This should NOT include general Internet training, just electronic mail training.)" There were 9 choices ranging from "No formal electronic mail training" through "13 or more hours." All workshop participants received at least 5 to 6 hours of instruction. (see Table 6)

### *Participation in Workshop Electronic Mail Instruction*

In this study, subjects that received electronic mail instruction during the four foreign language summer workshops are identified as "participants" and those who did not as "non-participants." Comparison of the two groups is central to this portion of the study.

## *Results*

### *Effect of Foreign Language Electronic Mail Instruction Electronic Mail Use*

According to questionnaire results, 16 of the 64 workshop participants and 17 of the 64 non-participants stated that they had access to an electronic mail account for over a year (Table 3), indicating that they possessed accounts prior to the workshop electronic mail instruction. This number also agrees with the number of participants and non-participants who listed electronic mail addresses on their application forms.

At the time the questionnaire was completed, 92.19% of the participants said they had access to electronic mail, while 57.14% of the non-participants said they had access. Table 3 indicates that there is a definite relationship between having access to electronic mail and participation in the electronic mail instruction taught during the four foreign language workshops.



[illegible]

**Table 6: Chi-square Test on the Number of Electronic Mail Messages Sent by Workshop Participants and Non-Participants with Electronic Mail Accounts**

Category	PARTICIPANTS				NON-PARTICIPANTS			
	N	Freq.	%	SR	N	Freq.	%	SR
	58				37			
0-1 message a week		11	18.97	1.82		16	43.24	2.86
2-4 messages a week		21	36.21	.61		8	21.62	.96
5 or more messages a week		26	44.83	.20		13	35.14	.32
$\chi^2 = 6.78$ $p < .05$								

heavier users ("5-7 messages a week" and "8 or more messages a week") The chi-square test indicates that there is a relationship between the amount of mail sent and participation in the workshop electronic mail instruction. There were more sporadic users, zero to one message a week, among non-participants (43.24%) than among participants (18.97%). Therefore, participants tended to be more regular users of electronic mail.

Table 7 indicates that electronic mail workshop participants received considerably more electronic mail instruction than non-participants. The

**Table 7: Frequency Distribution of the Number of Hours of Electronic Mail Instruction Received by Workshop Participants and Non-Participants**

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
	64			64		
No formal training		0	0.00		43	67.19
less than 1 hour		0	0.00		7	10.94
1-2 hours		0	0.00		6	9.38
3-4 hours		0	0.00		3	4.69
5-6 hours		36	55.25		1	1.56
7-8 hours		10	28.12		1	1.56
9-10 hours		2	3.13		0	0.00
11-12 hours		4	6.25		0	0.00
13 or more hours		4	6.25		3	4.69

majority of non-participants (67.19%) had no electronic mail instruction while the majority of the participants (55.25%) had at least 5-6 hours of instruction, the amount of instruction given during the workshops. A chi-square test could not be performed because of the large number of cells with fewer than 5 expected values.

### *Summary*

The results in Part I indicate that more participants, who received foreign language summer workshop electronic mail instruction, than non-participants had access and were using electronic mail. The majority of participants had their accounts for at least seven months. Participants sent messages more regularly than non-participants. The majority of non-participants had received little or no electronic mail instruction.

## **Part II: Factors that Affect the Use Of Electronic Mail by Both Participants and Non-Participants**

### *Methodology: Design*

In this second portion of the study, a post-experimental design, static group, was used to measure characteristics that significantly predict adoption of electronic mail by foreign language teachers.

### *Dependent Measures*

There were two dependent measures in this portion of the study: 1) the subject's use of electronic mail and 2) the number of messages electronic mail users sent.

### *Use of Electronic Mail*

The questionnaire item that established the level of the subjects' knowledge about and use of electronic mail was used to determine the subjects' use of electronic mail. Subjects had seven choices that ranged from "I know nothing about electronic mail" through "I use and will continue to use electronic mail" that described the present status of their electronic mail use.

The second item, "I have access to an electronic mail account" was indirectly used as a dependent measure because subjects filling out the questionnaire were told to complete the final questionnaire items (58-88 [58-100 for participants]) only if they had access to an electronic mail account.

### *Number of Messages Sent*

The number of messages sent by participants and non-participants who had electronic mail access was also used in this portion of the study. In this case, it assisted in determining the extent subjects used electronic mail.

### **Independent Measures**

There were seven independent measures in this portion of the study: 1) whether or not the teacher participated in the workshop electronic mail instruction, 2) the length of time the teacher had access to electronic mail, 3) the teacher's personal characteristics, 4) school and administration characteristics, 5) network characteristics, 6) electronic mail characteristics, and 7) the workshop electronic mail in-service education characteristics.

### *Electronic Mail Instruction*

Whether or not subjects received electronic mail instruction during the four summer workshops was included in this measure; 1 = participants, and 2 =

non-participants. A second item, as in the first portion of the study, was the number of hours of electronic mail instruction each participant and non-participant had received. (See Table 7)

#### *Length of Time of Electronic Mail Access*

The amount of time the teacher had access to an electronic mail account was expressed by one item: "I have had my electronic mail account for." There were six response choices ranging from 1 = "less than a month" through 6 = "over a year" (See Table 3).

#### *Teachers' Personal Characteristics*

Questions that dealt with teachers' personal characteristics included age, level of education, gender, years of teaching, level of teaching, and language taught, (see Table 1). Four items determined the number of times teachers contacted other teachers within and outside the school district, and four items indicated the number of times teachers used instructional and computer technologies during the semester. This section of eight items used a Likert-type scale that ranged from 1 = "15 or more times per semester" to 6 = "never"

Also included in this section were the subjects' innovativeness (risk-taking) and computer anxiety scores (See Table 2).

#### *School/Administration Characteristics*

Teachers' perceptions of how well the school and administration supported their use of computer related technologies were determined with eight questions such as: "Use of computer-related technologies by teachers is a high priority at my school" rated on a Likert-type scale 1 = "strongly agree" through 6 = "strongly disagree."

*Teachers' Network Characteristics*

This variable consisted of two categories: one requesting the type of electronic mail account the teacher was using and the second asking about the type of electronic mail access available to the teacher. The question that represented the first category: "My primary electronic mail service provider is:" had ten choices including "my school, region or state," "America Online" or "I don't know."

The second category was represented by nine questions intended to determine type of access and level of access: "I personally pay for my electronic mail account," "I belong to at least one newsgroup," and "My students use electronic mail in my classes." These questions could be answered by either "yes" or "no."

*Electronic Mail Characteristics*

Electronic mail characteristics significant in teachers' adoption of electronic mail were represented by 19 items rated on a 6-item Likert-type scale ranging from 1 = "extremely significant" to 6 = "not at all significant." An example of an item is: "Ability of electronic mail to improve my communication with colleagues."

*Electronic Mail Instruction Characteristics*

Participants also had 12 additional items with the same Likert-type scale (1 = "extremely significant" to 6 = "not at all significant") that referred directly to the effect of the electronic mail instruction they received during summer workshops on their adoption of electronic mail. An example of one of the questions is: "Success of all/most of the members of my workshop project group to obtain electronic mail access."



## *Results*

### *Electronic Mail Characteristics that Affect Adoption and Use of Electronic Mail*

Questionnaires sent to participants and non-participants included 19 questions that asked respondents who had noted they had access to electronic mail to indicate the degree of significance a particular electronic mail characteristic had on their adoption and use of the electronic mail. The 6-item Likert-type scale ranged from 1 = "extremely significant, 2 = "very significant," 3 = "significant," 4 = "moderately significant," 5 = "slightly significant," 6 = "not at all significant." Table 8 indicates 10 electronic mail characteristics that had a mean of 2.5 or less. In this case, "less" means more significant. The median is also included because it indicates the characteristics that at least 50% of the

**Table 8: Mean and Median of Electronic Mail Characteristics Workshop Participants and Non-Participants Found Most Significant in Their Adoption of Electronic Mail**

Category	N	M	SD	Med
Need to keep up with the latest technology trends in education	94	1.65	1.04	1.0
Availability of an electronic mail system that is relatively easy to use	94	1.71	1.01	1.0
Ability of electronic mail to provide contact with teachers and students around the world	94	1.82	1.30	1.0
Ability to receive a fast reply to messages	94	1.94	1.21	1.5
Ability to contact someone who is otherwise difficult to reach	94	1.95	1.32	1.0
Opportunity to increase computer skills	94	1.95	1.15	2.0
Ability to improve communication with colleagues	94	2.01	1.30	2.0
Ability to send/read messages anytime, day or night	94	2.11	1.46	1.5
Potential use in class with students	94	2.17	1.47	2.0
Ability to serve as an economical means of communication	94	2.23	1.51	2.0

Med = median

Note. Characteristics were judged on a six point scale as follows:

1=extremely significant

3 = significant

5 = slightly significant

2 = very significant

4 = moderately significant

6 = not at all significant

respondents found extremely significant in their adoption of electronic mail. Characteristics whose medians fell between 1.0 and 1.5 are defined as extremely significant.

There is an omission from this list that should be discussed at this time: "the availability of technical support at school." When a two-tailed t-test was performed on participants' and non-participants' significance ratings on this item, they differed significantly,  $p < .05$ . Participants ( $M = 3.26$ ) found technical support from school less important in their adoption of electronic mail than non-participants ( $M = 2.41$ ).

#### *Effect of Electronic Mail In-Service Education Characteristics on Electronic Mail Use and Adoption*

Participants' questionnaires included 12 additional questions that directly dealt with the significance of characteristics of the workshop electronic mail in-service education in their adoption of electronic mail. The 6-item Likert-type scale ranged from 1 = "extremely significant, 2 = "very significant," 3 = "significant," 4 = moderately significant," 5 = "slightly significant," 6 = "to not at all significant."

The two most significant workshop instructional characteristics that influenced participants' electronic mail adoption are indicated in Table 9. As with the previous table, characteristics whose means were less than 2.5 were considered significant. The two characteristics whose medians fell between 1.00 and 1.50 were considered "extremely significant."

#### *Predictors of Electronic Mail Use by Foreign Language Teachers*

To determine which characteristics predict whether or not an individual teacher will use electronic mail, responses to questionnaire items answered by

**Table 9: Mean and Median of In-Service Education Characteristics Workshop Participants Found Most Significant in Their Adoption of Electronic Mail**

Category	N	M	SD	Med
Opportunity for hands-on computer experience during the workshop electronic mail training	58	1.64	1.12	1.0
Ability of electronic mail to maintain contact with workshop leaders	58	1.91	1.20	1.0
Opportunity to have electronic mail training led by a foreign language educator	58	2.19	1.34	2.0
Introduction to basic electronic mail functions common in all electronic mail networks	58	2.21	1.51	2.0
Opportunity to participate in an electronic mail activity that could be used by students	58	2.24	1.59	2.0
Ability of electronic mail to maintain contact with other participants	58	2.31	1.59	2.0
Success of members of project group to obtain electronic mail accounts	58	2.41	1.59	2.0
<i>Note.</i> Characteristics were judged on a six point scale as follows:				
1=extremely significant	3 = significant	5 = slightly significant		
2 = very significant	4 = moderately significant	6 = not at all significant		

all 128 subjects, participants and non-participants, who were using electronic mail were used. The responses that represented 1) electronic mail instruction, 2) teachers' personal characteristics, and 3) school/administration characteristics were correlated with the dependent variable, subjects "knowledge about and use of electronic mail" (see Table 5). Because no subjects, participants or non-participants, chose the option "I have evaluated the use of electronic mail and have decided it will not work for me," for the item that represented "knowledge about and use of electronic mail," it could be used as a continuous variable in the regression. The result was that eight items had at least a .20 correlation with the dependent variable. Those items were used in the step-wise regression.

A step-wise regression was performed to determine which of the eight items served as predictors for the dependent variable, level of knowledge about and use of electronic mail. The result was a nine step regression (Table 10).

The single item that accounted for 23% of level of knowledge about and use of electronic mail was the "number of hours of formal electronic mail instruction" the subject had received. That predictor, however, was replaced in step four by "participation in foreign language workshop e-mail training." A second predictor, "School administration stresses importance of computer technologies by foreign language teachers" was replaced in step nine by "Use of computer-related technologies by teachers is a high school priority." The final

**Table 10: Step-wise Regression to Determine Predictors of Workshop Participants 'and Non-Participants' Disposition Towards Using Electronic Mail (N=124)**

Category	r	R	R <sup>2</sup> Adjust	R <sup>2</sup> Change	Step
<sup>1</sup> Number of hours of formal training	.49	.49	.23	.23	1
Contact with teachers outside of the school district	-.40*	.54	.29	.06	2
<sup>2</sup> School administration stresses importance of use of computer technologies by foreign language teachers	-.31*	.57	.31	.02	3
Computer anxiety	-.25*	.60	.33	.02	4
Participation in foreign language workshop e-mail training	-.46	.61	.35	.02	5
(Nothing added)	-.21	.61	.35	.00	6
Foreign language taught	-.23*	.63	.37	.02	7
Use of computer-related technologies by teachers is a high school priority		.65	.39	.02	8
(Nothing added)		.64	.39	.00	9

r = correlation between the factor and the dependent variable

R = multiple correlation coefficient

R<sup>2</sup> Adjust= square of the correlation coefficient adjusted for sample size and number of coefficients in the regression equation

R<sup>2</sup> Change = amount of increase in R<sup>2</sup> adjust from the last step

<sup>1</sup> Removed in step 6 because of a high correlation with "participation in foreign language workshop e-mail training."

<sup>2</sup> Removed in step 9 because of a high correlation with "Use of computer related technologies by teachers is a high school priority."

\* a reversed scale

result of the regression identified five predictors that accounted for 39% of the dependent variable:

- 1) Participation in foreign language workshop 5-6 hour e-mail instruction
- 2) Contact with teachers outside of the school district
- 3) Computer anxiety
- 4) Foreign language taught
- 5) Use of computer related technologies by teachers is a high school priority

It is important to note that contact with out-of-district teachers differed significantly between participants and non-participants. A chi-square test indicated that there is a relationship,  $p < .05$ , between participation in the workshop electronic mail instruction and out-of district contact of teachers. Participants had more out-of-district contact with teachers than non-participants. Sixty-four percent of the participants contacted teachers outside of the school district 15 or more times, while 36% of non-participants made the same contacts. Participant contact with other workshop participants and leaders could account for this difference.

#### *Predictors of the Extent of Electronic Mail Use*

Questionnaire items used in this portion of the study were answered by 94 of the 128 subjects, the participants (58) and non-participants (36) who indicated they had access to electronic mail. To determine which characteristics predict the number of messages sent, responses to the following questionnaire items were correlated with the item "number of messages sent" (see Table 6): electronic mail instruction, teachers' personal characteristics, school/administration characteristic, length of time of electronic mail access,

and teachers' network characteristics. Six items showing a high correlation, .33 or above, with "number of messages sent" were used in a stepwise regression shown in Table 11.

Table 11 indicates that a subject's use of Internet services accounted for 23% of the number of message sent. When the other three predictors are added, "contact with teachers outside of district," "belongs to at least one newsgroup," and "computer anxiety," 45% of the number of messages sent could be accounted for. The extent of the subject's contact with other educators and outside sources appears to affect the amount of messages sent.

**Table 11: Step-wise Regression to Determine Predictors for the Amount of Electronic Mail Use of Workshop Participants and Non-Participants, (N=91)**

Category	r	R	R <sup>2</sup> Adjust	R <sup>2</sup> Change	Step
Uses Internet services (e.g., telnet, gopher, WWW)	-.48	.48	.23	.23	1
Contact with teachers outside of district	-.44	.60	.34	.11	2
Belongs to at least one newsgroup	-.35	.64	.40	.06	3
Computer anxiety	-.35	.67	.45	.05	4

### *Summary*

Part II identified electronic mail and in-service education factors that subjects found significant in their adoption and use of electronic mail. Electronic mail factors significant in their adoption fell into two categories: 1) the opportunity to use technology and 2) the ability to maintain better contact with others. In-service education factors that workshop participants found significant in this study were: 1) practice using electronic mail, 2) curriculum

related instruction, and 3) ability for continued contact with workshop participants and leaders.

Predictors of electronic mail use included: 1) electronic mail instruction, 2) contact with teachers outside of the district, 3) school support 4) computer anxiety level, and 5) language taught. Predictors of number of messages sent were: 1) use of the Internet, 2) contact with teachers outside the district, and 3) computer anxiety level.

## **Discussion and Implications**

### ***Effective Electronic Mail Instruction***

The results of this research indicate that the five to six hours of electronic mail instruction received during the four summer foreign language workshops did have a positive effect on electronic mail access by K-12 foreign language teachers. Because workshop participants and non-participants in this study were comparable in gender, age, education, experience, teaching level, and language, they would most likely have the same opportunities to access electronic mail. Both groups, however, did not equally take the initiative to gain access. In this study, 80% of the participants indicated they were using and would continue to use electronic mail, compared to 42% of the non-participants.

This study also identified workshop characteristics that participants found significant in their adoption of electronic mail. Participants rated "opportunity for hands-on computer experience" as the most significant element that encouraged their adoption. The importance of hands-on experience supports Roger's (1983) findings that "trialability," the degree to which an innovation may be experimented with, is important in adoption.

The electronic mail instruction offered to workshop participants in this study was, however, not limited to teaching electronic mail skills. Because electronic mail instruction was performed as part of a foreign language workshop, it was designed to reflect the curriculum content of each workshop as well. Participants were required to prepare a post-workshop collaborative project that was based on the workshop curriculum. Because they needed to maintain contact with other teachers from around the country to complete the project, they were motivated to learn to use and access electronic mail.

The second most significant factor reported by participants was the "ability to maintain contact with workshop leaders." The opportunity to continue dialoguing with professionals after the initial workshop was a high motivator, as well as the leaders' input in the post-workshop projects. Another factor that also represents continued contact beyond the workshop was "the ability of electronic mail to maintain contact with other participants." The significance of these two factors support Roger's (1983) findings that "relative advantage" or "perceived need" have an notable effect on adoption. These factors were a directly result of the post-workshop group projects.

Other instructional elements participants found significant indicate the importance of relating electronic mail instruction to their workshop curriculum: "the opportunity to have electronic mail instruction led by a foreign language educator" and "the opportunity to participate in an electronic mail activity that could be used by students." These findings coincide with those of Collis (1992) who reported the importance of providing teachers with models of how they can manage telecommunications use in their classrooms.



### *Predictors for Electronic Mail Use*

When developing an electronic mail in-service education session, it is advisable to take into consideration the predictors for electronic mail use identified in this study

The strongest single predictor for the use of electronic mail by participants and non-participants was the number of hours of formal electronic mail instruction they had received. The greater the number of hours of electronic mail instruction an individual received, the more likely s/he was to use electronic mail. Participation in the foreign language workshop electronic mail instruction, lasting five to six hours, replaced the amount of instruction in the regression. This suggests the significance of the nature of the instruction as well as the amount of the instruction were significant in the adoption of electronic mail. The longer the instructional time, the more likely an individual will adopt electronic mail. The instruction should also support the individual's curriculum content area.

The second strongest predictor was the individual's contact with teachers outside of the school district. Those subjects who had more contact with individuals outside of the school district were more likely to use electronic mail. This predictor reinforces the importance of having an audience to whom to write. Creation of an audience for electronic mail use supports the findings of Riel, 1992; Cononelos & Oliva, 1993; and Moore, 1991.

A third predictor, the support of teacher use of computer technologies by the school administration, coincides with the findings of Sunal et al (1993) that potential support and working conditions of the adopter have an effect on the adoption/implementation of electronic mail.

Computer anxiety, a fourth predictor, relates to the anxiety or confidence an individual experiences when using computers, and to the development of a liking for their use (Massoud, 1991). This study found that the lower the computer anxiety level, the more likely an individual was to use electronic mail. This predictor supports research that indicates that the individual's attitude towards technology affects his/her use (Rogers, 1983; Baylor, 1985; Mruk, 1987).

A fifth predictor resulting from this study was that the language taught affected the likelihood that an individual would use electronic mail. The majority of teachers in the study taught French (34.38%) and Spanish (46.88%), while the remainder (18.74%) taught Japanese, German, Russian, Chinese and Latin. Teachers of the less commonly taught languages were found to be more likely to use electronic mail than those who taught Spanish and French. It should also be noted that K-12 teachers of less commonly taught languages are often the only teacher of that language in a department or school. Electronic mail provides them access to other colleagues who also teach their particular language outside their districts.

#### *Predictors for Number of Messages Sent*

The predictors for this portion of the study indicate that the number of electronic mail messages an individual sends is affected by his/her proficiency in using variety of telecommunications tools, need to communicate with teachers outside the district, and attitude towards computers. The ability to use other aspects of the Internet, such as telnet, gopher and the World Wide Web was the strongest predictor. Other predictors were the need to contact educators outside the school district, subscription to at least one newsgroup, and the

individual's computer anxiety level. These predictors also support Rogers' (1983) theory that an individual's motivation and attitude affect the adoption of an innovation.

### *Significant Factors in the Adoption of Electronic Mail*

Electronic mail characteristics that both participants and non-participants who indicated they had electronic mail access rated as most significant in their adoption were: "the need to keep up with the latest technology trends in education," "the ability of electronic mail to provide contact with teachers and students around the world," "the ability to improve communication with colleagues," "the potential use in class with students," and "the opportunity to increase computer skills." These factors are all directly related to their roles as educators. The remaining characteristics they rated as significant in their adoption could be described as an improved means of communication: "the ability to contact someone who is otherwise difficult to reach," "the ability to send/read messages anytime, day or night," and "the ability to serve as an economical means of communication." All of the characteristics would fall into Rogers' (1983) categories of *relative advantage* and *compatibility*, indicating that they are high motivators for adoption.

A final characteristic that was rated as very significant in adoption was the "availability of an electronic mail system that is relatively easy to use." This characteristic would meet Roger's (1983) definition of *complexity*.

The availability of external assistance, often cited as essential in the adoption of technology (Sunal et al, 1993), was not a characteristic rated as significant by both groups. This study suggests that a teacher who has received electronic mail instruction comparable to that of the foreign language

workshops may need less assistance in getting on-line, or may make more of an effort to locate available assistance. Workshop participant messages sent to the researcher describing their efforts to obtain electronic mail access (Shelley 1995-b) indicate that many participants experienced extreme difficulties in establishing their accounts. They did not, however, give up trying to obtain electronic mail access when most teachers would.

### Conclusions

Results of this study indicate that diffusion-based electronic mail instruction designed to take into consideration Rogers' (1983) five characteristics that affect an individual's perception of an innovation was effective in encouraging foreign language participants to adopt the medium. This study also supports earlier diffusion-based research in the adoption and use of electronic mail that suggests that characteristics of the individual, medium, and supporting organization are influential in an individual's adoption of electronic mail.

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**POST-INSTITUTE CONNECTIONS:  
IMPLEMENTATION AND OUTCOMES OF AN  
DIFFUSION-BASED ELECTRONIC MAIL INSTRUCTIONAL MODEL<sup>1</sup>**

A paper to be submitted to Foreign Language Annals

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**Abstract**

Computer-based technologies are not being readily adopted by foreign language educators. Electronic mail's potential to increase opportunities for language exchange and establish ties with other cultures makes it an excellent introduction for foreign language teachers to the power of computer-based technologies in education. This study describes the diffusion-based electronic mail instruction integrated into the four National K-12 Foreign Language Resource Center<sup>2</sup> 1994 summer institutes attended by 86 foreign language educators. The instruction was designed to introduce institute participants to a computer-based technology and provide them with a means of communication as they completed post-institute collaborative projects. Results of this study suggest that the diffusion-based instruction was effective in encouraging participants to use electronic mail.

**Introduction**

Computer-based technology is now readily evident in the daily lives of today's society: banking, cooking, business, and entertainment. Thornberg (1994) described this period as the Communication Age, evolved from breakthroughs

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in compression and transmission of data that potentially allows anyone anywhere to have easy access to information. Thornberg predicted that education will change as a result of the new technologies of the Communication Age, a change that could be extensive. Sheingold (1991) reported that changes in education will involve intensive curriculum reform based on: 1) an emerging consensus about learning and teaching, 2) a movement toward well-integrated uses of technology, and 3) the push for restructuring. Educators must be prepared to direct these changes.

The National Standards in Foreign Language Education (1995) describes five foreign language standards developed from input from foreign language teachers from around the country: 1) communicate in languages other than English, 2) gain knowledge and understanding of other cultures, 3) connect with other disciplines and access new information, 4) develop insight into own language and culture, and 5) participate in multilingual communities and global society. The new standards meet Sheingold's first agenda, an emerging consensus about learning and teaching. Her second agenda, a movement toward well-integrated uses of technology, is reflected in the reference to the use telecommunications as a medium for students to contact students and retrieve information from the target country, as found in several of the National Standards' sample learning scenarios.

Although the use of computer-based technologies has been recognized as an effective medium in meeting the new foreign language standards and is becoming more evident in today's schools in general, foreign language teachers have been slow to adopt the medium (Willis, 1992). Yet, computer-based applications, including telecommunications, can be powerful tools that support second language acquisition (e.g. Cononelos and Oliva, 1993; Herron and Moos,

1994; Armstrong and Yetter-Vassot, 1994). According to Marantz and England, (1993), teachers must be instructed to use computer-based technologies in order to develop confidence in and control of a technology before they risk bringing it into their classrooms. Unfortunately, little has been written about preparing foreign language teachers to use telecommunications networks.

During the summer, 1994, the National K-12 Foreign Language Resource Center (NFLRC) at Iowa State University offered four institutes to 86 K-12 foreign language teachers and several college/university methods professors. Institute content was based on three NFLRC initiatives: 1) use of effective teaching strategies, 2) development of performance assessments, and 3) use of new technologies (Rosenbusch, 1995). Electronic mail instruction was included in each institute's curriculum to introduce participants to a new technology and to facilitate collaboration among participants following the institute for the completion of post-institute collaborative projects.

This study describes an diffusion-based electronic mail in-service education model developed to introduce foreign language educators to a useful computer-based technology and to provide them an effective and efficient medium with which to collaborate with group members on a post-institute project. Also discussed are several outcomes of the participants' electronic mail instruction identified by three data sources: 1) 759 participant electronic mail messages, 2) a final evaluation report of the NFLRC institutes, and 3) a related study comparing participant's electronic mail use with foreign language teachers who did not receive instruction.

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## Background

### *Use of Computer Technologies by Foreign Language Teachers*

Although foreign language educators' use of computer-based technologies, especially the use of computer networks, has been shown to promote language acquisition (Garrett, 1991; Chun and Brandl, 1992; Cononelos and Oliva, 1993; Kern, in press), K-12 foreign language teachers along with teachers of English, history, art and music, are not readily using computers with their students (Willis, 1992). Willis found that the majority of original computer users, and therefore current school technology leaders, tend to have science, math, and business backgrounds, what he termed the *hard disciplines*. Much of technology instruction, therefore, tends to favor hard disciplines rather than the humanity-based disciplines such as foreign language, English, history, art, and music, which Willis called *soft disciplines*.

Willis (1992) recommended that when introducing a new technology, it should be compatible with teachers' values and beliefs: "If we are to increase the 'uptake of technology' in the soft disciplines we must provide them with software that 'fits' the way they think and instruction that acknowledges, respects, and uses paradigms of computer use that are compatible with the soft disciplines" (86). As Willis suggests, foreign language educators have fewer role models and less support to encourage them to adopt computer-based technologies than some of their colleagues from hard disciplines.

### *Preparing Teachers to Use New Technologies*

In 1988 the Office of Technology Assessment (OTA) found that most teachers wanted to use technology, but did not because they had little or no instruction on how to use computers as teaching tools (Fulton, 1988). Bosner

and Daughtery (1994) confirmed the importance of in-service in the dissemination of new technologies in the schools. Preparing teachers to use computer-based technologies involves introducing them to the benefits of the technology in their curriculum, mastery of mechanics of the technology, and finally, its integration into their classes, a process not quickly accomplished. Sheingold and Hadley (1990) found that five to six years were required before teachers felt they had a command of the technology, were able to assess its usefulness, and knew how and when to use it in more than routine ways.

It is important that technology in-service instruction include an explanation of why technology is important (Brunner, 1992) in order for teachers to perceive a need to use the technology (Collis, 1993). Teachers' feelings about using computers can range from uncertainty to hostility, from fear to euphoria, all of which will affect their eventual adoption (Chin and Hortin, 1993-94). The objective of a technology in-service should be to overcome the uncertainty and fear that teachers may experience in using that technology.

### *Diffusion of Innovations Theory*

Requesting educators to adopt a new technology is asking them to change their current behavior to some extent. Rogers (1983) describes that change process as diffusion, "the process by which an innovation is communicated through certain channels over time among members of a social system (5)." He describes an *innovation* as "an idea , practice, or object that is perceived as new by an individual or other unit of adoption (11)." According to Rogers (1983) an individual must go through a mental process, an *innovation-decision process*, before adopting or rejecting the innovation. That process includes five steps: 1)

knowledge of an innovation, 2) formation of an attitude toward the innovation, 3) decision to adopt or reject, 4) implementation of the new idea, and 5) confirmation of the final decision (Rogers, 1986).

Rogers (1983) states it is the individual's perception of an innovation that determines whether or not that innovation is adopted. He identified five characteristics that influence how an individual perceives an innovation: *relative advantage*, whether an innovation is seen as being better than what it replaces; *compatibility*, how much an innovation is found to be consistent with the existing values, past experiences, and needs of the adopter; *complexity*, how difficult the innovation is to understand and use; *trialability*, how available an innovation is for experimentation on a limited basis; and *observability*, to what degree the results of an innovation are visible to others.

#### *Factors that Influence Electronic Mail Adoption*

Specific characteristics of electronic mail, of the adopter, and of the adopter's organization have been identified as affecting adoption (e.g., Golden, Beauclair, and Sussman, 1992; Ruberg and Sherman, 1992; Hiltz and Johnson, 1990; Sunal, Sunal, and Scheffler, 1992; Hamilton, 1990). The majority of characteristics found to positively influence individuals' use of electronic mail are directly related to the individual's perception of its improvement over other means of communication, or its relative advantage. Electronic mail links users to important people or organizations (Golden, Beauclair and Sussman, 1992), it is fast, can be easily accessed by one or many, offers a time lag before response, is asynchronous (written at one time, read at another) and reduces phone tag (Ruberg and Sherman, 1992). Electronic mail provides access to messages anytime during the day, night, or week-end (Hiltz and Johnson, 1990), is

efficient (Sunal, Sunal and Scheffler, 1993) and offers educators valuable telecommunications experience (Hamilton, 1990).

An individual's personal attributes also have an effect on whether or not s/he uses electronic mail. Hamilton (1990) found that teachers who were most inclined to be *early adopters* of electronic mail were at least 39 years old, had 11 or more years of teaching experience, frequently contacted teachers outside of school, had earned an advanced degree, had a positive attitude towards computers, and had a positive attitude towards risk. Rogers (1983) defines early adopters as individuals who adopt quickly and who, because of their respected social standing, often promote change in a population. Hiltz and Johnson (1990) reported that an individual's previous experience with computers and his/her attitude towards computers were strong predictors for electronic mail use.

A teacher's school environment also affects his/her electronic mail adoption. Sunal et al (1993) identified the following organizational characteristics as important in a teacher's use of electronic mail: the school principal must be actively supportive; teachers must have a level of collegiality, trust, support, interaction and communication; and external assistance must be available when needed. Teachers also need to be given the time and opportunity to experiment with the new technology (Preskill, 1988). They should be provided with easy access to hardware and software if they are to be expected to use it (Riel and Levin, 1990).

Hiltz and Johnson (1990) and Golden et al (1992) reported that an incentive be provided or degree of pressure to use an electronic mail system should be placed on the user to encourage use. The most effective network activities require an end product, such as a collaborative project, that provides

users with a reason and a focus for their communication (Collis, 1993; Riel and Levin, 1990).

In summary, computer-based technologies are slow to be adopted by foreign language educators because there have been few foreign language technology role models and instructional models. It is important that technology instruction reflect teachers' curricular specialization because their perceptions of the potential use of that technology in their professions will affect whether or not the technology is adopted. Effective instruction, a teacher's need to communicate, school district support, certain electronic mail attributes, and teachers' individual characteristics have been found to promote or inhibit electronic mail adoption. Instruction should emphasize the factors that encourage adoption, and strive to minimize factors that impede adoption.

## **Methodology**

### ***Institutes***

During the summer, 1994, the NFLRC offered four institutes, two that concentrated on effective teaching strategies and two that were technology oriented. The Teacher Partnership Institute, a teaching strategies oriented institute, was attended by 13 practicing K-6 teachers and 9 college/university methods professors. Participants "explored appropriate curricula, strategies, materials, activities, technology, and assessment for K-6 foreign language programs (Rosenbusch, 1994, p. 2)." The Teacher Partnership Institute extended over 10 days, while the other three institutes lasted five days. During the Curriculum Institute, 19 K-12 foreign language teachers and 5 foreign language curriculum specialists "collaborated to identify and address common problems



of articulations and to explore the impact of long-sequence foreign language programs and standards movement (Rosenbusch, 1994, p. 2)."

The New Technologies in the Foreign Language Classroom Institute, the first of the technology institutes, was attended by 20 K-12 foreign language educators who "previewed exemplary foreign language courseware and explored the enhancement of the existing curricula through the development of lessons using computer-mediated communication and the Internet (Rosenbusch, 1994, p. 2)." During the Interactive Multimedia Institute, the second technology institute, 20 K-12 foreign language teachers "examined exemplary multimedia hardware and software and the benefits of using multimedia in foreign language education (Rosenbusch 1994, p. 3)."

Participants from each institute were responsible for completing a post-institute collaborative project. The projects required participants to network with other participants from around the country.

### *Subjects*

Eighty-six foreign language teachers from 36 states attended the four NFLRC summer institutes. Institute participants were selected for their involvement and commitment to teaching a foreign language, their potential to impact foreign language education, their language ability, and evidence of excellence in teaching. Applicants for the two technology-oriented workshops were also evaluated on their level of use of technology. The majority of participants were women, at least 40 years old, who had earned an M.A. degree or higher, and had taught at least 11 years at the high school, junior high/ middle school, or elementary levels. Nine college/ university methods professors attended the Teacher Partnership Institute because of the content and

goals of this institute. Languages taught among all participants included Spanish, French, Chinese, German, Hebrew, Japanese, Latin, Quecha, Romanian, and Russian (Rosenbusch 1994).

### ***Institute Electronic Mail Instruction***

As previously mentioned, support of continued dialogue among participants, and between participants and leaders, to facilitate the completion of post-workshop collaborative projects was a primary reason for including electronic mail instruction in each institute's curriculum. The opportunity to introduce participants to a valuable computer-based technology served as a second reason. Electronic mail instruction was not limited to the use of hardware and software. Improving participants' attitudes towards electronic mail was of prime importance since it is those attitudes that predict teachers' adoption behaviors. The instructional model described below (see Figure 4) was designed especially for participants in the NFLRC. This model takes into consideration Rogers' (1983) five characteristics that influence an individual's perception of an innovation: relative advantage, compatibility, complexity, trialability, and observability.

### ***Pre-Institute Preparation***

Before attending the institute, participants were asked to fill out an electronic mail questionnaire indicating whether or not they had an electronic mail address and their level of experience using electronic mail. Because only 32% of the participants had accounts, and 66% had very little or no experience using electronic mail, instruction was designed that would include a basic introduction to the medium and provide hands-on experience.

Temporary electronic mail accounts were arranged through the Iowa State University Computation Center to allow participants access to Vincent, the campus electronic mail network and Internet gateway. Account usernames for each participant were pre-assigned and a common password was used to avoid confusion. A step-by-step description of the electronic mail system was written that included explanations of how to send, receive, read, and forward mail. The document also contained images of the computer screens involved in each step. This aspect of the instruction was meant to reduce the complexity of participants' hands-on experience.

### *On-Site Instruction*

The electronic mail instruction was directed by the researcher, an experienced K-12 foreign language teacher with an instructional technology background. During three institutes, electronic mail instruction was presented two hours a day over three days, totaling approximately six hours. Due to time constraints, participants of the Curriculum Institute received four to five hours of instruction over two days. A 21-station Macintosh lab located in the College of Education networked to Vincent served as the site for the hands-on instruction. Although most participants had individual access to computers, during the two workshops with more than 21 participants a few teachers were requested to take turns working in pairs.

The first session of each institute's electronic mail instruction began with an hour-long general description of networks. Included were network vocabulary and several advantages of using networks and electronic mail in foreign language education. This portion of the instruction concluded with recommendations on incorporating the use of networks into foreign language

lessons. Participants received a list of their temporary Iowa State University electronic mail addresses, a glossary of networking terms, and a sheet of *smileys*, like the "happy smiley" : -), that allowed them to express emotions in their messages. Handouts also included information on how to subscribe to two foreign language listservs<sup>3</sup>, FLTEACH and LLTI, that provide users access to hundreds of other foreign language teachers. A 15-minute video, *Global Quest: The Internet in the Classroom*<sup>4</sup> was shown to acquaint participants with Internet services. The objective of this portion of instruction was to emphasize the compatibility of electronic mail with foreign language goals and objectives.

Hands-on instruction began with a brief introduction on how to turn on a Macintosh computer, and then how to access Vincent, the ISU electronic mail network. Vincent, a UNIX based network, has a menu driven interface that resembles a DOS rather than a Macintosh platform. It should be noted that the Vincent network software is unique to ISU, therefore no participants would have had access to an identical network. Participants with some network experience found Vincent to be more difficult than their home networks, others found it easier. Using Iowa State University's network did provide them with experience in the basic functions of electronic mail. Hands-on instruction provided participants with the opportunity to experiment with electronic mail, trialability.

During the first hands-on instruction session of each institute, two to three experienced ISU Vincent users, in addition to the instructor, circulated the room to assist participants. Even with detailed oral and written directions of how to send, receive, read, and forward electronic mail, participants became easily frustrated dealing with the network. Some had difficulty entering their usernames and passwords correctly, others with navigating the introductory

screens to set up the program configurations, and several sent initial messages that were incomplete.

The network itself was occasionally undependable because it was capable of handling a finite number of users at a time. An electronic mail instruction session requires that the network be capable of accepting 20 to 24 teachers on-line simultaneously. During one session, the network was unable to accommodate all of the institute users because of high Iowa State University student use of the network at that time. Participants were then required to work in pairs to complete the session's activities. Although the occasional unreliability of the network was inconvenient, participants learned that dealing with network inconsistencies was just another of the aspects of using electronic mail. Participants became aware of several of the problems they might have to deal with when using electronic mail. Though the complexity of using electronic mail was not diminished by the electronic mail instruction, it may have been better understood, and therefore more easily tolerated.

After participants practiced exchanging messages among each other they were assigned a mini-project, a simulation of an electronic mail exchange they might perform while completing their final post-institute collaborative projects. Groups of three or four teachers were given a short time to meet face-to-face to formulate simple research questions that they could ask of their colleagues related to the institute they were attending. They performed the remainder of the activity entirely on-line gathering responses to their research questions from other workshop participants, processing answers, and preparing a final report, using only the network for communication. Although at least two hours were spent on the mini-project, most groups were unable to finish it completely. Everyone agreed, however, that the value of the activity lay in the process,

rather than the product. Several commented that an activity such as the mini-project could also be used with students. This portion of the instruction focused on the relative advantage of electronic mail to maintain contact with participants and leaders, and also offered an opportunity to simulate working on a collaborative project using a network, trialability.

The final hour of instruction was spent discussing various ways to access electronic mail: available network providers, types of access (ethernet versus modems), modem speeds, and necessary software. It was designed to answer participant's questions about the first steps of setting up access, and relieve some of the complexity.

### *Post-Institute Support*

Although the NFLRC was not able to subsidize participants' electronic mail use, it offered support and several services to assist participants in establishing electronic mail access, to relieve some of the complexity of using the medium. Participants' administrators were mailed letters requesting their assistance in providing electronic mail accounts to facilitate participants' completion of post-institute projects. Participants received complimentary copies of America On-Line software that allotted them ten free hours of connection time during the first month. Modems were made available for the school year to participants who requested them; only four were requested.

Electronic mail lists were set up by the NFLRC to enable participants to send a message to all members of a workshop with a single address. A master list was also developed so that individuals could write to participants of all four institutes using one address. As each participant notified the NFLRC of his/her electronic mail address, it was sent via the list to all participants of the institute

already on-line. An NFLRC staff member was available to answer any technology questions that might arise.

Institute leaders were also requested to use electronic mail regularly with participants. In fact, electronic mail was used by the NFLRC and leaders to determine the progress of post-institute collaborative projects and to update participants on interesting events related to their institutes. Participants were strongly encouraged to use electronic mail to maintain contact with project group members and leaders to complete the collaborative projects. They received regular correspondence from the leaders and the NFLRC concerning issues relating to their institute, the Center, or foreign language education in general.

The diffusion-based electronic mail instruction offered by the NFLRC introduced participants to a medium with which to maintain contact with other participants in order to complete the post-institute project, underlining its relative advantage. Uses of networks with other teachers and students around the world were also introduced during the instruction, relating its compatibility to foreign language education. Participants were provided with the opportunity to experiment with using electronic mail, trialability. Available NFLRC assistance and requested support from school administrators was intended to reduce some of the difficulties participants would have obtaining electronic mail access, a reduction of complexity. The observability characteristic was indirectly present during the electronic mail instruction, when the participants were able to identify themselves as "technology users."

### *Data Sources*

Because three different primary data sources and a fourth secondary source were used to determine the outcomes of participants' electronic mail instruction, this study will employ *triangulation*, the use of several data sources to study the same phenomenon (Denzin, 1994 ). The three data sources are: 1) 759 messages voluntarily sent by participants to the researcher, 2) the final NFLRC evaluation report prepared by the Research Institute for Studies in Education (RISE) (Kemmis and Lively, 1995), and 3) a related study comparing the electronic mail use of 1994 K-12 institute participants with similar foreign language educators (Shelley, 1995). The fourth source, a self-report electronic mail questionnaire completed by participants prior to electronic mail instruction, served as a baseline for participants' increase in electronic mail use.

#### *Self-Report E-Mail Questionnaire*

Before attending the institutes, participants were requested to complete the self-report questionnaire developed to determine participants' level of electronic mail experience so that appropriate instruction could be designed. Two questionnaire items from that instrument were used for this study. The first item established participants' level of electronic mail experience with the question, "My experience with e-mail is." Participants chose one of five responses: "None, ""Very little," "Some," "Quite a bit," and "Extensive." The second question determined whether or not participants had access to an electronic mail account: "My e-mail address is...."

Eighty-three participants (97%) returned questionnaires. Results indicated that before attending the institute, 69% of the participants had had very little or no experience using electronic mail, 22% some experience, 8%,



quite a bit of experience, and only one participant, 1%, had extensive experience (See Figure 1). Figure 2 shows pre-institute electronic mail experience broken down by institutes. Most of the participants who indicated they had quite a bit or extensive experience attended the two technology related institutes. However, most participants in all four institutes knew little or nothing about using electronic mail.

### *Participant's Messages*

The data from this portion of the study was obtained from 759 electronic mail messages voluntarily sent to the researcher. The messages came from two sources: 1) those exchanged among participants and voluntarily forwarded to the researcher and 2) those sent directly to the researcher. It should be noted that every participant did not regularly forward all group correspondence, but evaluation of the quantity and content of the messages received indicates that the majority did comply with the request. The first message was dated July 13, 1994, after the end of the first institute, and the last messages were sent February 6, 1995, following the deadline for the final project.

Participants' messages were used to determine who was using electronic mail. By February 6, 1995, 76 of the 86 participants, 88%, had reported they had electronic mail access and had sent the NFLRC their electronic mail addresses. Figure 3 summarizes data relating to the number of participants in each institute who were using electronic mail prior to and following instruction. The data also indicates that although there were more participants attending technology institutes who had e-mail addresses prior to institute attendance, the number of participants with electronic mail addresses seven to nine months following the electronic mail instruction was about the same for all institutes.

All of the participants of the New Technologies Institute, however, reported having electronic mail addresses. New Technologies Institute participants spent more time on-line during their institute since they explored Internet resources as well as used electronic mail.

A review of participants' electronic mail addresses indicated that a variety of network service providers were used. Of the 76 participants who had electronic mail addresses, 37 (48%) had access through their school, region, or state; 11 (14%) through a college or university, 19 (25%) through America Online, 5 (6%) through CompuServe, 2 (3%) through Prodigy, and 2 (3%) through another commercial service. It is evident from the wide variety of networks being used that the instruction participants received on Iowa State University's Vincent system did not prepare them for the particular network they would eventually use. Yet, participants did successfully access a variety of electronic mail networks.

The messages themselves provided a comprehensive record of the progress of group projects and participants' use of electronic mail. The majority of the 759 messages related to participants' progress on post-institute projects. Because of its focus on participants' electronic mail use, this study concentrated on 312 of the 759 messages that mentioned the individuals' use of electronic mail. Two group projects, one from the New Technologies Institute and one from the Interactive Multimedia Institute, involved collecting information about foreign language sources on the Internet. Messages that related to only those projects, and not the individual's personal electronic mail use, were not included in the study, although they did deal with an aspect of telecommunications. During the reading of the electronic mail messages four categories emerged: 1) problems getting and staying on-line, 2) participants'

electronic mail access, 3) NFLRC support, and 4) spin-off activities related to electronic mail instruction.

### *Problems Getting and Staying On-line*

The 50 messages that fell into this category described obstacles participants' needed to overcome in order to establish and maintain their electronic mail access. Most participants indicated that setting up an e-mail connection was a considerable struggle.

In many cases, participants' schools were unable to provide them with easy access to electronic mail. Several schools were in the process of installing new networks; but because the process was slow, participants were unable to use them. Teachers from schools that did have computer networks that supported electronic mail exchange often found that the networks were overloaded and time-consuming to use. They found it difficult to find time during the school day to access the system, read, reply to, and send messages. Four participants used accounts of their media specialist, computer coordinator, or colleague to correspond with group members. They found this type of access inefficient, but appreciated the assistance they received in learning to use the network.

The complaint of a lack of dependability of the network used was consistent in a large number of messages that fell into this category. Several teachers commented that messages went astray, were sent or received by the wrong person, or disappeared for days or weeks, only to reappear again. These problems could be attributed to user or network errors. Others indicated that their networks were periodically inoperable. Another common complaint was that the networks they used were very slow and time-consuming to use. In the following quote, a participant expresses her frustrations to a group member:

This is (participant's name) reporting in about two months late. I got on Internet during October, then, before I could send you my first installment, the University computer... got overhauled (a new system) and those of us on remote got cut off. It took them three weeks to get around to everybody and restore our numbers....The frustrations of getting started with this program were almost defeating. I gave up many times, but took a deep breath and decided to make another telephone call or (write) another letter. Eventually I was able to convince (the university) to let me on their system. Then all the technical glitches, etc. I am glad to finally be communicating...

To resolve difficulties in accessing electronic mail, several participants purchased their own modems and paid for their own accounts. They also sought assistance from family members, colleagues, students, and even students' parents.

#### *Participants' Electronic Mail Access*

The majority of the messages, 107, were categorized as "participants' electronic mail access" because they were sent by participants to announce their new e-mail addresses to the researcher and to other participants. Many of the messages requested responses so that the sender could verify that the message had been received. An example of such a message sent to group members is:

It is a rainy day in Los Angeles....but that is not the REALLY BIG NEWS....the headlines should read 'Technophobe conquers communications superhighway.' This note is to alert you guys that I (participant's name) have an E-mail address... Please type me a line just to

give me a thrill of knowing that you exist in cyberspace, as well as you existed in Ames, Iowa.

Participants' reports on the progress of their group interaction were also included in this classification. These messages recounted who was and was not on-line, welcomed new users, and offered encouragement and support to group members for continued use of electronic mail, as well as conducting group project business. Some messages, like the following sent to the researcher, expressed a group's e-mail success:

We have had a rough start, for awhile I was the only one on-line from my sub-group...kind of lonesome. Everybody is on-line now.

Others expressed the need for all members to be on-line for the group to work smoothly and the efforts group members made to encourage each other to find electronic mail access. Getting the groups on-line was not without frustration as the next message illustrates:

(group member) and I finally 'connected' via answering machine tag. She now has a modem from the institute and has been waiting for her school to get it hooked up. So far, no luck...She did say that she's probably going to get her own AOL account at home so she can get in touch...As much as I love e-mail, I'm really getting close to picking up the phone so we can regroup without waiting for all corners of the country to get mail and respond.

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*NFLRC Support*

Although the NFLRC did not provide participants with financial support to set up their electronic mail accounts, it did provide them with a conduit for information relating to electronic mail use and assistance in connecting with other participants. In their e-mail messages, participants inquired about electronic mail set-up, new or corrected e-mail addresses, how to access the Internet, how to set up mailing lists using a listserv; locating e-mail addresses; and decompressing files. The majority of the 101 messages identified in this category were addressed directly to the researcher.

Many of the messages in this category related to corrections and additions the mailing lists maintained by the NFLRC. Several participants requested assistance in developing their own mailing lists. Because of their lack of expertise in using telecommunications and because of the erratic operation of some of the networks, participants occasionally requested the NFLRC to forward messages to other group members. They also asked that the NFLRC confirm that their messages had actually been received.

Also included in this category were the messages that expressed the participants' appreciation for the opportunity to use electronic mail. Many commented that learning to use the medium opened a new world of technology to them. The following message was addressed to the participant's group, institute leader, and the researcher:

I have been having so much fun now that I have E Mail!!!!...I am grateful to you all for making it possible. I do not think I would have done E Mail for a long time, if ever, since I am very new to computers. I must confess I was not thrilled that first hot night in August when we trooped over to

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the computer building. But I guess you can teach an old dog new tricks. When I get a letter from someone I never heard of asking for some information that I can share, it truly boggles my mind to think of all the possibilities for the future.

Several participants indicated that using electronic mail helped them overcome their computer anxiety, as the following excerpt sent to the NFLRC Director illustrates:

Hi! I can't believe I am using E-mail. I guess I have lost the fear I usually have when I am in front of a machine, any machine....MIL GRACIAS for your help, guidance and support.

Participants appreciated that the NFLRC-maintained mailing lists and assistance in sending and confirming initial messages. Participants indicated that the electronic mail instruction and assistance was crucial to their use of electronic mail.

### *Spin-Off Activities Related to Electronic Mail Instruction*

The 54 messages that fell into this category described participants' activities related to their electronic mail use, but were not directly connected with their post-institute projects. Several participants succeeded in setting up penpal exchanges with each other and with students from Japan and France. Two of the methods professors indicated that they were using electronic mail to correspond with their students. Two teachers, one who taught German and the other, Russian sought e-mail addresses of other participants' colleagues who taught those languages. One participant mentioned that she was attempting to establish a state-wide listserv for foreign language teachers. Several participants

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became members of school technology committees. Others presented electronic mail and Internet workshops to their colleagues. Two teachers wrote articles about using technology with their students for state publications.

The following three messages written by an elementary teacher of Japanese serve as an example of the enormous leap many participants made from learning to use electronic mail during the NFLRC institutes to becoming technology leaders in their schools, and in some cases, communities.

October 9, 1994

... I want to let you know that my panic stage is over and I am patiently working on (e-mail). One of my daddy's from last year's class helped me out for four days before and after school. Thank goodness for talented parents.

January 8, 1995

You would not believe, what you and Marcia have made me. My husband, who knows how I deal with machines worries about this situation. Anyhow, just to let you know that because I became acquainted to e-mail, now I am the e-mail expert at school. I also belong to the school's technology committee to help make goals for the school's technology curriculum. All I can say is that I am doing my best.

January 14, 1995

I got our city zoo biologist to try and to use e-mail...the biologist did not have access to e-mail AT THE ZOO (unbelievable isn't it!). I got my first message today. I hope that the zoo would want to do something with us since, we can not go to them due to cost of field trip. I am so excited and I



wanted to let you know. I got the ZOO people thinking about using e-mail to link up with schools !

These three messages demonstrate how one teacher overcame her computer anxiety, obtained electronic mail access, found someone to assist her in learning to use the network, became recognized as an electronic mail expert in her school, and finally reached out to bring community resources into her classroom using electronic mail.

Although acquiring electronic mail access was difficult and frustrating for a large number of participants, most succeeded. They overcame network problems, unavailability of equipment and funds, and personal computer anxiety to establish electronic mail communication with group members to complete their final projects. NFLRC support encouraged them to establish regular communication with group members. Many participants, however, did not limit their electronic mail use to completing post-institute projects. They used electronic mail with their students, and contacted other teachers not connected with the NFLRC. Several began to take leadership roles in their schools, districts, and states to promote the use of electronic mail and computer-based technologies in foreign language education.

### *Final Evaluation Report*

The formal evaluation of the four summer institutes was conducted by Kemis and Lively (1995) of the Research Institute for Studies in Education (RISE) at Iowa State University. The focus of the evaluation was to assess the degree to which the NFLRC goals had been met. The evaluation report contains data collected from participants prior to institutes, immediately following institutes, and at the end of participants' academic year.

Because this study described in this paper concentrates on final results of the electronic mail instruction, only the data from the RISE follow-up study is used here. The self-report Follow-Up Survey of National K-12 Foreign Language Center Institute Participants is made up of three parts. The first part consists of three questions regarding the amount of communication participants had with staff, leaders and other participants evaluation instrument was sent to participants at the end of the academic year following their institute attendance. Possible responses to the three questions were: "too little," "about right," and "too much." The second section consists of nine questions dealing with usefulness of communication with and support from Center, leaders, and participants; and usefulness of the institute content and the project. Participants rated this section on a six point Likert-type scale ranging from "strongly agree" to "strongly disagree." Participants also responded to four open-ended questions asking them to describe: 1) how they had changed their teaching as a result of the past year's experiences with the NFLRC, 2) formal information sharing and presentations given since the institute, 3) informal information sharing, and 4) comments. This study deals primarily with data gathered from the first three questions and the open-ended questions of the RISE follow-up survey.

Data gathered from the first three questions regarding participants' attitude about the amount of contact with staff, leaders and participants indicated that 82% of all participants felt their contact was about right. The remaining 18% felt that they had too little contact with institute staff, leaders and participants. No one rated the contact as too much. This suggests that the majority participants from all four institutes were satisfied with their communication with NFLRC staff, institute leaders, and other participants.

Results of the open-ended questions indicated that educators from the Teacher Partnership Institute felt more comfortable with computers and technology, especially with electronic mail. Others indicated that they were now "looking for opportunities to incorporate the technology" (Kemmis and Lively, 1995, p. 24). Partnership participants noted that the biggest gain from their institute was the opportunity to network with other teachers. According to the report, the institute created opportunities for teachers to make contacts that they maintained after it ended. Curriculum institute participants also indicated that they were beginning to use the computer as a teaching tool and the Internet as a vehicle to get information and share ideas. They also mentioned the importance of their opportunity to network with other teachers. One participant wrote, "the collegiality that was established was powerful (Kemmis and Lively, 1995, p. 29)." Several participants indicated that they were using the Internet to share ideas and get information.

New Technologies Institute participants indicated that the institute had encouraged them to increase their electronic mail use and had given them a greater awareness of the possibilities for increasing networking and incorporating technology into the classroom. As a result of the institute, many participants have assumed leadership roles in their districts and/or states regarding the use of technology. Participants of the Interactive Multimedia Institute also mentioned using electronic mail with their students as well as incorporating uses of HyperStudio. One frustration indicated by a member of this group was the lack of computer access for foreign language students.

Institute participants' opportunity to network with other foreign language teachers and with NFLRC leaders and staff, as well as the increased use

of technology with students for both the technology-related and non-technology-related institutes were recurring themes in responses to the survey.

*Related Study on the Effect of Electronic Mail Instruction on Participants' Adoption*

A related study compared electronic mail use of the same sample of 1994 NFLRC summer institute participants with similar K-12 teachers who did not receive NFLRC institute instruction, or non-participants (Shelley, 1995). Non-participants were K-12 foreign language teachers who had applied to attend the 1994 institutes, but who for reasons of language taught, level taught, and geographical distribution were not selected. Both participants and non-participants received high scores on the application evaluation instrument.

Shelley's study concentrated on K-12 educators and did not include college/university methods professors. Data were collected using a self-report questionnaire mailed to NFLRC participants and non-participants eight to ten months following the institutes. The questionnaire covered the subject's background, use of instructional technology, use of electronic mail, factors the subject considered important in his/her electronic mail adoption, computer anxiety level, and risk-taking level. Questionnaires were returned by 83% of participants and 78% of non-participants. This study will focus on Shelley's comparison of electronic mail use by participants and non-participants, predictors for electronic mail use by foreign language teachers, and instruction characteristics that were significant in participants' adoption of electronic mail.

Electronic mail use differed between participants and non-participants; 80% of participants used electronic mail compared to 42% of non-participants (Shelley unpublished). When comparing participants and non-participants

who used electronic mail, more participants than non-participants sent electronic mail regularly, at least two messages a week. When the amount of instruction each group had received was compared, all of the participants had received at least five or six hours of electronic mail instruction, while the majority of non-participants (67%) had received no electronic mail instruction.

Six predictors for electronic mail use were identified in Shelley's study:

1) NFLRC electronic mail instruction, 2) the amount of contact teachers had with educators outside of the school district, 3) school support of teachers' use of computer technologies, 4) teachers' computer anxiety level, 5) and the foreign language taught. Teachers of less commonly taught languages were more likely to use electronic mail than teachers of more commonly taught languages like Spanish and French.

Electronic mail in-service education factors that participants found most significant in their adoption were: 1) hands-on computer experience, 2) continued contact with workshop leaders, 3) instruction led by a foreign language educator, 4) introduction to basic electronic mail functions, 5) participation in an electronic mail activity that can be used by students, 6) continued contact with other participants, 7) success of project group to obtain electronic mail access.

### **Discussion and Recommendations**

In the following section the results of the three data sources suggest that diffusion-based instruction does affect adoption of electronic mail. This study also found that an individual's need to communicate and persistence in overcoming obstacles were factors related to institute electronic mail

instruction. Also included is evidence of the extent to which participants used electronic mail beyond institute related activities.

### *Effect of Diffusion-Based Instruction*

Results from this study suggest that the diffusion-based instructional model used to introduce electronic mail to foreign language teachers was effective in encouraging their adoption of the medium. Participants' messages indicate that 81% of NFLRC participants, those who did not have electronic mail accounts prior to the institute instruction, were able to obtain electronic mail access by the end of the study. Shelley (1995) found that electronic mail use by institute participants was significantly greater than that of foreign language teachers of equivalent backgrounds who had not attended the institutes. Participants sent electronic mail more regularly than non-participants. Therefore, it can be assumed that institute electronic mail instruction did positively affect participants' adoption of electronic mail.

Shelley's (1995) related study, when evaluating participants and non-participants who used electronic mail, found that participation in NFLRC institutes was a predictor of electronic mail use. The institute electronic mail instruction was designed to take into consideration Roger's (1983) five characteristics that influence an individual's perception of an innovation: relative advantage, compatibility, trialability, complexity, and observability (see Figure 4). The hands-on experience using electronic mail offered participants the opportunity to experiment with the medium (trialability), the technical support available from the NFLRC and friends, colleagues, and family made the learning experience less difficult (complexity), and regular references made by the instructor and other institute participants to uses of electronic mail in the

classroom with students were mentioned by participants as being significant in their decision to adopt the medium (compatibility). The importance of the diffusion-based instructional model is reflected in the in-service education factors that participants found significant in their adoption: hands-on experience, curriculum-related instruction, use of activities with students, and presentation of basic electronic mail functions (Shelley, 1995). Participants' referral to institute instruction as the reason for their electronic mail use supports Shelley's findings.

### *Need to Communicate*

The assignment of a post-institute collaborative project motivated participants to adopt electronic mail. In order to successfully complete the projects, participants needed to find an efficient way to communicate with group members scattered around the country. Therefore the need to communicate played a very important role in participants' adoption of electronic mail. RISE's final evaluation (Kemmis and Lively, 1995) found that participants' desire to continue communication with each other following the institutes appeared to be their greatest motivator to use electronic mail. According to Shelley (1995), another predictor for electronic mail use was "contact with teachers outside the school district. "

Both Shelley's (1995) and RISE's (Kemmis and Lively, 1995) findings are supported by participant messages that describe participants' efforts to create an efficient network to complete the projects. Participants' messages reflected their urgency to have all members of their project group on-line. They encouraged those who were not yet on-line to use electronic mail. When most of a group

was successfully on-line, the majority of the project planning was done using electronic mail.

Participants' messages also indicated that their electronic mail communication was not limited to institute participants with the sole purpose of completing the project. Messages that did not directly relate to participants' electronic mail projects indicated that participants were seeking contact with other teachers in their language area, setting up communication opportunities for their students, and even establishing a statewide listserv enabling all foreign language teachers to establish contact.

Many participants indicated that they found electronic mail an ideal medium for collaboration because it served as an efficient and economical means of communication. The efficiency and economy of electronic mail support the findings of Golden et al (1992); Ruburg and Sherman (1992); Hiltz and Johnson (1990); and Sunal et al (1993).

### *Persistence in Overcoming Obstacles*

Participants' motivation to communicate impelled them to overcome many obstacles to gain electronic mail access. Institute participants requested to establish electronic mail access, yet no NFLRC funds were made available for them to finance the cost. They were instructed on Vincent, a system that was different from what many had used, so they needed to relearn the process of sending and receiving mail. Participant messages indicated that some had technical support at school, though many did not. Many of the networks they used were undependable. These are obstacles that would discourage most individuals from establishing an account and using electronic mail, but the data indicates that the majority of participants managed to overcome them.



A final obstacle that participants overcame was their own computer anxiety. Several messages indicated that participants avoided using computers before being exposed to electronic mail. The same messages suggest the participants' excitement in using the medium, and even suggest a change in participants' attitudes towards computers as a whole.

Participants' perceived need to continue collaboration was a major factor in their adoption process. Their required execution of a collaborative project successfully pressured participants to use electronic mail as an economical means to continue collaboration. The recommendation that a degree of pressure should be placed on the individual to use the system supports the findings of Hiltz and Johnson (1990), Golden et al. (1992); Collis (1993), and Riel and Levin (1990).

#### *Extended Electronic Mail Use*

Electronic mail instruction concentrated primarily on participants' use of electronic mail to maintain contact with each other. Although there was some reference to its use with students, this area was only lightly covered. Therefore, an interesting result of this study is the extent that participants used electronic mail beyond institute related activities. Participant messages indicated that several participants who had not used electronic mail prior to institute attendance were setting up keypal connections (penpal exchanges over a network) with their students and students around the country and the world. Others indicated that they had become technology leaders in their schools, districts, and states.

The RISE evaluation report (Kemmis and Lively, 1995) also reported that teachers from both the technology and non-technology institutes were

beginning to incorporate computer use into their classes. That use included electronic mail.

Although electronic mail adoption and the beginning of its implementation into teachers' curricula appeared to be taking place, this study does not cover the integration of electronic mail into the curriculum. Sheingold and Hadley (1990) found that the inclusion of technology in a teacher's curriculum is a process that requires from 5 to 6 years. It is interesting to note that the participants of this study fit Rogers' (1983) and Hamilton's (1990) definitions of 'early adopters,' individuals who tend to adopt more quickly than the early majority, late majority and laggards (Rogers, 1983).

### *Recommendations*

Results from the three data sources, suggest that electronic mail diffusion-based instruction was successful in promoting electronic mail adoption by institute participants. Figure 4 illustrates the electronic mail in-service education model that resulted from this research. Institute diffusion-based instruction assisted participants in forming an attitude towards using electronic mail. Figure 4 also presents the elements this study found significant in educators' decision to adopt electronic mail, placing them into Rogers' five categories that affect an individual's perception of an innovation.

It is suggested that the model in Figure 4 could also be useful in the introduction of computer-based technologies in general. The following are general recommendations, adopted from the model, for introducing computer-based technology to educators:

- Relate computer-based technology instruction to educators' curriculum area.

- Provide adequate opportunity for hands-on experience with the technology.
- Create situations where educators are required to use the technology.
- Provide adequate instructional time for educators to learn the technology.
- Provide technical support.
- Allow educators to be involved in how computer-based technologies may be used in education.

### **Conclusions**

The potential of electronic mail to increase opportunities for language exchange and establish ties with other cultures makes it an excellent vehicle to introduce foreign language teachers to the power of computer-based technologies. It is important that a model be established that will effectively prepare foreign language teachers to use electronic mail.

Foreign language educators have been slow to adopt computer technologies because there are few instructional models for its use in a foreign language curriculum. Often computer in-service education relates to the general use of the medium in education and does not reflect foreign language educators' particular curriculum focus. Because adoption of a new technology is affected by an individual's perceptions of that technology, technology instruction for foreign language teachers should strive to improve their attitudes toward the technology as well as instruct them how to use it.

In the NFLRC institute instruction, serious consideration was given to relate electronic mail use to foreign language teachers' needs and interests.

Institute participants were given ample opportunity to experience using electronic mail. Efforts were made to provide technical support to assist them with mechanical, organizational and communication problems. An important aspect of the model was institute participants' need to use electronic mail to facilitate completion of a post-institute collaborative project.

Results suggest that institute electronic mail instruction promoted adoption and use by participants. An important factor in the adoption of electronic mail was participants' need and desire to maintain contact with each other and leaders following the institutes. The requirement of completing a post-institute collaborative project required them to find a means to communicate with group members. Because of their need to contact each other, participants overcame obstacles in setting up and maintaining electronic mail access that have discouraged many teachers from continuing their effort.

Noteworthy too is that many participants extended their electronic mail use beyond institute communication. Several who had barely touched computers prior to electronic mail instruction were using computer technologies with their students and were involved in the implementation of technology in their schools.

The diffusion-based institute electronic mail instruction was effective in promoting adoption of the medium by foreign language educators. Participants' reasons for adoption also directly relate back to Rogers' five characteristics that affect an individual's perception of an innovation, as illustrated in Figure 4. It is important to note that this study also supports Rogers' findings that the adoption of an innovation is directly affected by an individual's perceptions of that perception.

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### Notes

1. This research was funded by the U.S. Department of Education, Office of Postsecondary Education, Center for International Education, under grant no. P229A3005 to Iowa State University. The opinions expressed in this report do not necessarily reflect the positions or policies of the Department of Education
2. For more information about the National K-12 Foreign Language Resource Center write to: Dr. Marcia Rosenbusch, Director, N157 Lagomarcino Hall, Iowa State University, Ames, IA, 50011, telephone: 515-294-6699.
3. A program for automating mailing lists. Two such lists relating to foreign language are FLTEACH and LLTI.
4. Global Quest: The Internet in the Classroom is available from the NASA National Research and Education Network (NREN) K-12 Initiative. Contact: K-12 NREN Video, Teacher Resource Center, NASA Ames Research Center, Mail Stop T-025, Moffett Field, CA 94035. Internet: GET.VIDEO@QUEST.ARC.NASA.GOV. Fax: (415) 604-3445.

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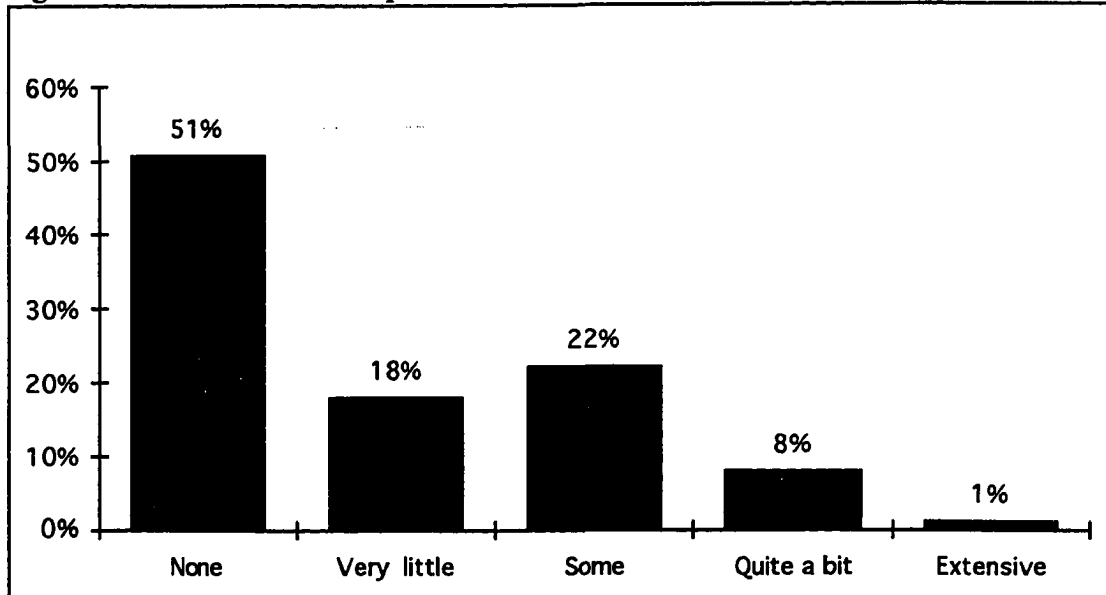
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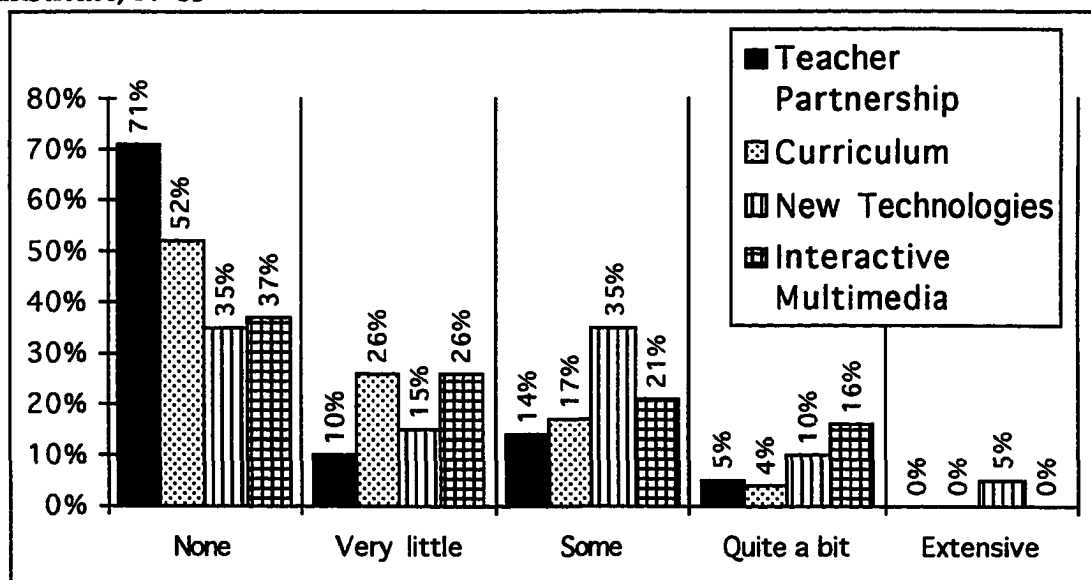
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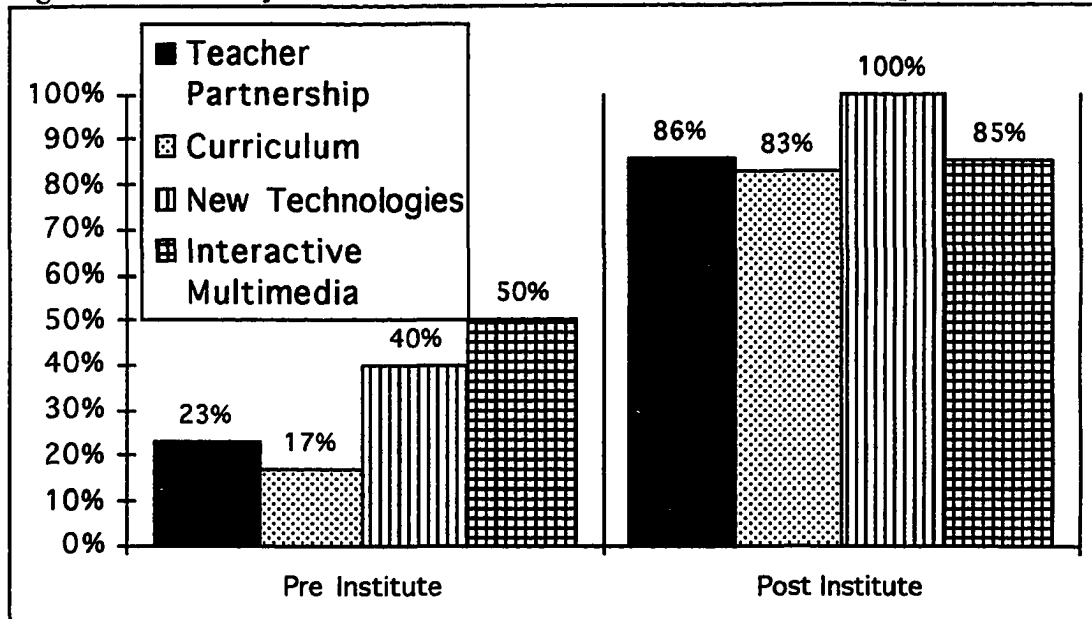


**Figure 1: Electronic Mail Experience of Institute Participants, N=83\***

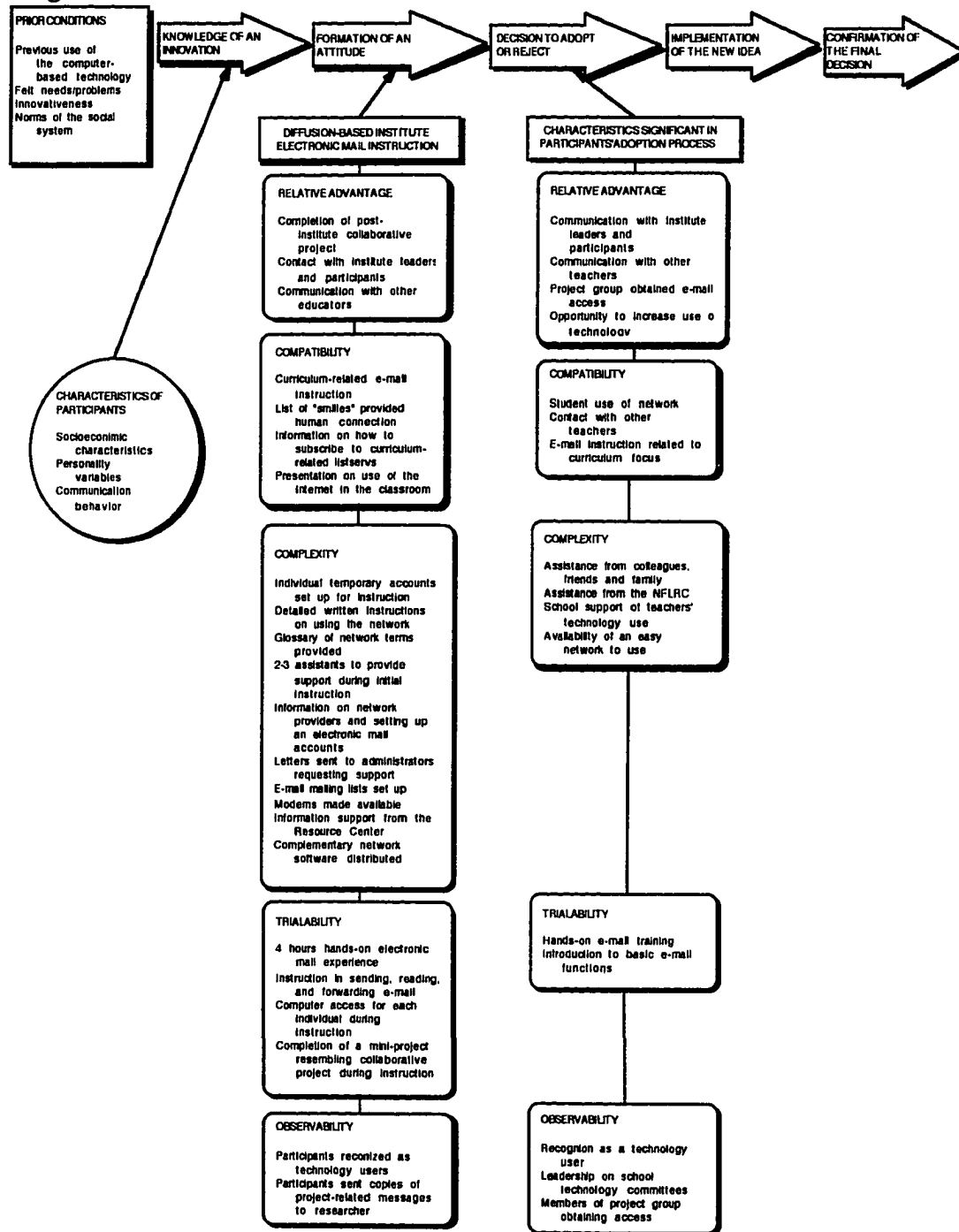
\*3 questionnaires were not returned

**Figure 2: Electronic Mail Experience of Institute Participants, Broken Down by Institute, N=83\***

\*3 questionnaires were not returned

**Figure 3: Summary of Electronic Mail Access of Institute Participants, N=86**

**Figure 4: Model of the Role of Institute Electronic Mail Instruction in the Five Stages in the Innovation-Decision Process**



This model was adapted from Rogers' (1983) model of stages in the innovation-decision process (165).

## **GENERAL CONCLUSIONS**

### **Summary and Recommendations**

The first paper, "Technology in Foreign Language Education: Potential Challenges and Possible Solutions," presents a description of the use of computer-based technologies by foreign language educators, and presents an argument for the use of electronic mail in foreign language education. Several suggestions for promoting electronic mail adoption are: 1) locate network access, 2) provide experience with hardware and software, 3) develop an effective in-service education program, 4) account for learning time, 5) account for participants' perceived needs, 6) encourage administrative support, and 7) create communication incentives.

The second paper, "Factors that Affect the Adoption and Use of Electronic Mail by K-12 Foreign Language Educators," compares responses from a self-report questionnaire completed by K-12 foreign language workshop participants and non-participants, teachers who did not attend the workshops. Results discussed include: 1) effective electronic mail instruction, 2) predictors for electronic mail use, 3) predictors for number of messages sent, 4) significant factors in the adoption of electronic mail.

Three data sources are triangulated in the third paper, "Post-Institute Connections: Implementation and Outcomes of a Diffusion-Based Electronic Mail Instructional Model." The sources are 759 participant electronic mail messages, a final evaluation report of the 1994 institutes, and data from the second paper. Results of this paper include discussion of : 1) effects of diffusion-based instruction, 2) participants' need to communicate, 3) participants'

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persistence in overcoming obstacles, 4) participants extended electronic mail use beyond institute-related activities.

Described in this study is a diffusion-based model for electronic mail instruction that integrates the use of technology directly into the general workshop curriculum. Electronic mail was introduced to workshop participants to provide them with an effective means to communicate with group members to complete a post-institute collaborative project. Results from this study suggest that a diffusion-based in-service-education model promoted electronic mail adoption by foreign language educators.

Participants' motivation to establish an efficient means of communication assisted them in overcoming obstacles involved in setting up and learning to use an electronic mail account. Workshop electronic mail instruction and participants' desire to continue communication following the workshop were found to be a significant factors in their adoption. Other significant factors included their interest to use technology, electronic mail's efficiency as a communication medium, and the potential use of electronic mail with students. In-service education factors that participants considered significant included curriculum-oriented instruction and the success of group members in obtaining electronic mail accounts.

Results of this study suggest that diffusion-based instructional model was successful in promoting electronic mail adoption by institute participants. The following are general recommendations, developed from the results of this study, for introducing a computer-based technology to educators:

- Relate computer-based technology instruction to educators' curriculum area.

- Relate computer-based technology instruction to educators' curriculum area.
- Provide adequate opportunity for hands-on experience with the technology.
- Create situations where educators are required to use the technology.
- Provide adequate instructional time for educators to learn the technology.
- Provide technical support.
- Allow educators to be involved in how computer-based technologies may be used in education.

### **Suggestions for Future Research**

Suggestions for further research, stemming from this study are as follows:

- 1) Explore the relationship between the amount of time an electronic mail in-service education program lasts and its effectiveness in encouraging electronic mail access.
- 2) Compare the effectiveness of general electronic mail and subject specific electronic mail in-service education programs.
- 3) Explore the effect of electronic mail instruction on the integration of electronic mail use into the teacher's curriculum
- 4) Determine if the instruction of early adopters in electronic mail use has a significant effect on the use of their colleagues.
- 5) Determine the effect of electronic mail instruction on a teacher's implementation of computer-based technologies.

**APPENDIX A.**  
**INSTITUTE APPLICATION EVALUATION FORMS**

---

## Institute Application Evaluation Form (TECHNOLOGY)

Score

\_\_\_\_\_/40

Name\_\_

Institute

Evaluator

Date

## I. Primary Consideration Criteria

very weak

average

very strong

a. Evidence of involvement  
and commitment to teaching  
a foreign language

1 2 3 4 5

b. Potential to impact foreign language education

1. Intention and potential to share  
knowledge

1 2 3 4 5

2. Evidence of leadership in foreign  
education

1 2 3 4 5

c. Evidence of language ability/  
background

1 2 3 4 5

d. Evidence of excellence in teaching

1 2 3 4 5

e. References

1. Strength of references

1 2 3 4 5

2. References (position) \_\_\_\_\_ , \_\_\_\_\_

f. Other

1 2 3 4 5

## II. Secondary considerations

a. Teaching level: Elem

Mid Sch

Second

Col/Univ

b. Language(s) taught:

c. State:

d. For technology institutes only:  
Expertise with computers

1 2 3 4 5

## III. Evaluator comments:



**Institute Application Evaluation Form (NON TECHNOLOGY)**  
 \_\_\_\_\_ /35

Score

Name \_\_\_\_\_

Institute

Evaluator

Date

**I. Primary Consideration Criteria**

very weak

average

very strong

 a. Evidence of involvement  
and commitment to teaching  
a foreign language

1      2      3      4      5

b. Potential to impact foreign language education

 1. Intention and potential to share  
knowledge

1      2      3      4      5

 2. Evidence of leadership in foreign  
education

1      2      3      4      5

 c. Evidence of language ability/  
background

1      2      3      4      5

d. Evidence of excellence in teaching

1      2      3      4      5

e. References

1. Strength of references

1      2      3      4      5

2. References (position) \_\_\_\_\_ , \_\_\_\_\_

f. Other

1      2      3      4      5

**II. Secondary considerations**

a. Teaching level: Elem \_\_\_\_\_ Mid Sch \_\_\_\_\_ Second \_\_\_\_\_ Col/Univ \_\_\_\_\_

b. Language(s) taught:

c. State:

**III. Evaluator comments:**

**APPENDIX B**  
**ELECTRONIC MAIL USE QUESTIONNAIRE**

## E-Mail Questionnaire

Name \_\_\_\_\_

*Please answer the following questions and return this questionnaire in the enclosed envelope.*

- |  | None<br>Extensive | Very little | Some          | Quite a bit |   |
|--|-------------------|-------------|---------------|-------------|---|
| 1. My experience with e-mail is:   | 1                 | 2           | 3             | 4           | 5 |
| 2. I have used (Circle all that apply if you are experienced):   |                   |             |               |             |   |
| America Online   CompuServe   Prodigy   Internet   Other _____   |                   |             |               |             |   |
| My e-mail address is: _____  |                   |             |               |             |   |
| 3. I have access to a computer:  |                   |             |               |             |   |
| At school:   | Yes               | No          |               |             |   |
| At home:   | Yes               | No          |               |             |   |
| 4. The type of computer I have access to is:   |                   |             |               |             |   |
| (For example: Macintosh, Apple, IBM, IBM compatible, None)   |                   |             |               |             |   |
| 5. I have access to a modem:   | Yes               | No          | I don't know. |             |   |
| 6. My school will support my need to use e-mail:   | Yes               | No          | I don't know. |             |   |
| 7. I would like you to contact my principal, department head, or technology coordinator to express the need for me to use e-mail to achieve the goals of this institute. (Circle one). |                   |             |               |             |   |
|  | Yes               | No          |               |             |   |

Please contact:

Name \_\_\_\_\_

Title

Address

Telephone (Include area code)   -   -

APPENDIX C.  
QUESTIONNAIRE: PARTICIPANTS

POST-INSTITUTE QUESTIONNAIRE COVER LETTER

March 30, 1995

Dear Institute Participant,

It has been 8 to 10 months since you were here in Iowa for a National K-12 Foreign Language Resource Center institute. Since that time 76 of you have succeeded in acquiring electronic mail access. The Resource Center would like to know to what extent you are using electronic mail, and the factors that assisted or prevented you from obtaining your access.

Will you please take approximately twenty minutes to complete the enclosed survey. This survey addresses the following areas: background information, your attitude towards computer technology, your use of computer technology and electronic mail, and the significance of your institute electronic mail training on your adoption/non-adoption of electronic mail.

Data collected from this survey will be used by us to prepare future institutes. Results will be made available at request from the National K-12 Foreign Language Resource Center.

Sincerely,

Marcia Rosenbusch  
Director

## **Survey of Technology and Electronic Mail Use By National K-12 Foreign Language Resource Center Institute Participants**

As 1994 institute participants of the National K-12 Foreign Language Resource Center, please complete this survey on your use of technology and electronic mail. The survey items address the following themes: background information, attitude towards technology, use and potential use of computer technology and electronic mail, and the effect of aspects of the institute electronic mail training on your adoption of electronic mail.

The results of this survey will assist the National K-12 Foreign Language Resource Center in providing future technology training that better meets the needs of foreign language educators. Results will be made available at request from the National K-12 Foreign Language Resource Center.

Your assistance is very much appreciated. All information that you supply will be kept strictly confidential. No individual will ever be identified in any reports. Thank you for your response.

**This survey should take you approximately 20 minutes to complete.**

**Please return the answer sheet to this questionnaire in the enclosed stamped envelope to :**

**National K-12 Foreign Language Resource Center  
300 Pearson Hall  
Iowa State University  
Ames, Iowa 50011**

**PLEASE MAIL BY APRIL 15, 1995**

**Filling Out the Green Answer Sheet:**

Please put all of your responses on the enclosed answer sheet, using a #2 pencil.

On the left side of **SIDE ONE** of the answer sheet in the category **IDENTIFICATION NUMBER** please fill in the **LAST 4 DIGITS** of your social security number in A, B, C, D.

In **SPECIAL CODES**, under **K**, fill in 1, 2, 3, or 4 to indicate the institute you attended.

- 1=Teacher Partnership Institute
- 2=Curriculum Institute,
- 3=New Technologies Institute,
- 4=Interactive Multimedia Institute.

Please make no other marks on the left side of the answer sheet.

## Section I: Background Information

This section will be used to gather background information.

Please darken completely with your pencil the letter on your answer sheet that corresponds to the letter that represents your best answers each question.

1. What is your gender?
  - A. Female
  - B. Male
2. Which category represents your most recent degree?
  - A. BA/BS
  - B. MA/MS
  - C. PhD/EdD
3. In which age category do you fall?
 

A. 20-29	D. 50-59
B. 30-39	E. 60-over
C. 40-49	
4. How many years have you been a professional educator?
 

A. 1-5	E. 21-25
B. 6-10	F. 26-30
C. 11-15	G. 31 and over
D. 16-20	
5. What is your primary teaching assignment? (choose only one)
 

A. Elementary school teacher	E. Curriculum director
B. Middle school/ junior high teacher	F. Administrator
C. High school teacher	G. Other
D. K-12 teacher	
6. What foreign language is your primary teaching assignment? (choose only the one )
 

A. Chinese	E. Latin
B. French	F. Russian
C. German	G. Spanish
D. Japanese	H. Other
7. How long have you been using a computer?
 

A. I don't use a computer	F. 4 years
B. less than a year	G. 5 years
C. 1 year	H. 6 years
D. 2 years	I. 7 years
E. 3 years	J. more than 7 years

Please choose the response below that represents how often you engage in each activity listed in #8-15 during a typical semester (approximately 18 weeks).

A = 15 or more times per semester  
B = 7 to 14 times per semester  
C = 3 to 6 times per semester

D = 1 to 2 times per semester  
E = once a year  
F = never

8. I contact (by phone, letter, e-mail, etc.) teachers outside of my school but within my school district.  
A = 15 or more times per semester  
B = 7 to 14 times per semester  
C = 3 to 6 times per semester  
D = 1 to 2 times per semester  
E = once a year  
F = never
9. I contact (by phone, letter, e-mail, etc.) teachers outside of my school district.
10. I contact personnel of my local education agency or equivalent.
11. I attend educational conferences.
12. I use overhead transparencies in my classroom during instruction.
13. I use videotapes in my classroom during instruction.
14. I use audiotapes in my classroom during instruction.
15. I use a computer in my classroom for instructional purposes.

**Section II: Attitudes Towards Computer Related Technologies**  
Responses to this section will indicate how you might adapt to using computer related technology. PLEASE MARK THE LETTER ON THE ANSWER SHEET THAT BEST DESCRIBES YOUR OPINION.

A = strongly agree  
B = agree  
C = slightly agree

D = slightly disagree  
E = disagree  
F = strongly disagree

16. Having a computer available to me would improve my productivity.
17. If I had to use a computer for some reason, it would probably save me some time and work.
18. I am aware that I am usually one of the last people in my group to accept something new.
19. If I used a computer, I could get a better picture of the facts and figures.
20. I am reluctant about adopting new ways of doing things until I see them working for people around me.
21. Having a computer available would improve my general satisfaction.
22. Having to use a computer could make my life less enjoyable.



A = strongly agree

B = agree

C = slightly agree

D = slightly disagree

E = disagree

F = strongly disagree

23. I am generally cautious about accepting new ideas.
24. Having to use a computer could make things easier for me.
25. I feel very negative about computers in general.
26. I rarely trust new ideas until I can see whether the vast majority of people around me accept them.
27. Having a computer available to me could make things more fun for me.
28. I find it stimulating to be original in my thinking and behavior.
29. I tend to feel that the old way of living and doing things is the best way.
30. If I had a computer at my disposal, I would try to get rid of it.
31. I look forward to a time when computers are more widely used.
32. I am challenged by ambiguities and unsolved problems.
33. I doubt if I would ever use computers very much.
34. I must see other people using new innovations before I will consider them.
35. I avoid using computers whenever I can.
36. I enjoy using computers.
37. I feel that there are too many computers around now.
38. I am challenged by unanswered questions.
39. Computers are probably going to be an important part of my life.
40. A computer could make learning fun.
41. If I were to use a computer, I could get a lot of satisfaction from it.
42. I often find myself skeptical of new ideas.
43. If I had to use a computer, it would probably be more trouble than it was worth.
44. I am usually uncomfortable when I have to use computers.
45. I sometimes get nervous just thinking about computers.

### Section III: Use and Potential Use of Computer Technology

Responses to this section will indicate how readily available technology is to you at home and at school. PLEASE FILL IN THE LETTER ON YOUR ANSWER SHEET THAT BEST REPRESENTS YOUR ANSWER.

A = strongly agree

B = agree

C = slightly agree

D = slightly disagree

E = disagree

F = strongly disagree

46. The use of computer related technologies by teachers is a high priority at my school.
47. My school administration believes that it is important for foreign language educators to be able to use computer related technologies.  

A = strongly agree	D = slightly disagree
B = agree	E = disagree
C = slightly agree	F = strongly disagree
48. My school administration believes that it is important for students to be able to use computer related technologies.
49. Necessary quality computer software and hardware are readily available to me at my school.
50. Technical assistance for computer related technologies is available when I need it .
51. My school/school district provides the training I need to effectively use computer related technologies.
52. My colleagues give me the support I need regarding the use of computer related technologies in instruction.
53. I have positive support from my administrators regarding the use of computer related technologies in instruction.
54. I intend to integrate computer related technologies into my teaching in the near future.

The following questions relate to your use or non-use of electronic mail. Electronic mail is a message, typed by the sender on a computer, then transmitted electronically to the receiver's computer where it is read at the receiver's convenience.

55. Please indicate the number of hours of formal electronic mail training you have had over the past two years. (This should NOT include general Internet training, just electronic mail training.)  

A. 5-6 hours (number of hours offered to Center participants)
B. 7-8 hours
C. 9-10 hours
D. 11-12 hours
E. 13 or more hours

56. Please choose a single answer corresponding to the statement that most nearly represents the **present** status of your use of electronic mail:
- A. I know nothing about electronic mail.
  - B. I know about electronic mail, but lack complete information.
  - C. I am interested in electronic mail, but lack complete information.
  - D. I have evaluated the use of electronic mail and have decided it will work for me, but have not had the opportunity to use it.
  - E. I have evaluated the use of electronic mail and have decided it will not work for me.
  - F. I have tried using electronic mail. (Any attempt is counted as a trial).
  - G. I use and will continue to use electronic mail.
57. I have access to an electronic mail account.
- A. yes
  - B. no

If your answer was "YES" to question #57, PLEASE CONTINUE TO ANSWER THE REMAINDER OF THE QUESTIONNAIRE.

If your answer was "NO" to the previous question (#57), you have finished the survey. Thank you for taking your time to fill out this questionnaire. Please return the answer sheet in the enclosed, self-stamped envelope. **DO NOT FOLD THE ANSWER SHEET.** (It is not necessary to return the questionnaire.)

58. I have had my electronic mail account for:
- A. less than a month
  - B. 1-3 months
  - C. 4-6 months
  - D. 7-9 months
  - E. 10-12 months
  - F. over a year
59. My primary electronic mail service provider is
- A. my school, region or state
  - B. a college or university
  - C. a freenet
  - D. America Online
  - E. Prodigy
  - F. CompuServe
  - G. Delphi
  - H. another commercial service
  - I. Minitel Services Company
  - J. I don't know
60. In an average week I send the following number of messages
- A. I have an electronic mail address but do not send messages regularly
  - B. 0-1 message a week
  - C. 2 messages a week
  - D. 3-4 messages a week
  - E. 5-7 messages a week
  - F. 8-10 messages a week
  - G. more than 10 messages a week

Please answer the following questions with:

A =yes                      B =no

61. I personally pay for my electronic mail account.
62. I share my account and password with other faculty members.

A =yes                      B =no

- 63. I primarily access my electronic mail account from school.
- 64. I primarily access my electronic mail account from home.
- 65. I belong to at least one newsgroup.
- 66. I belong to at least one listserv.
- 67. I use Internet services (e.g. telnet, archie, gopher, World-Wide Web/Mosaic/Netscape) as well as electronic mail.
- 68. My students use electronic mail in my class(es).
- 69. My students use the Internet in my class(es).

#### Section IV: Influence of Electronic Mail Characteristics that Affect the Use of Electronic Mail by Foreign Language Educators

Responses to this section will indicate the significance a particular characteristic of electronic mail and your Resource Center Electronic mail training had on your eventual use of electronic mail.

For each number please select the response that best describes the significance each characteristic had on your decision to use electronic mail during the past 8-10 months. PLEASE ANSWER ACCORDING TO THE SCALE BELOW:

A = extremely significant  
B = very significant  
C = significant

D = moderately significant  
E = slightly significant  
F = not at all significant

- 70. The ability of electronic mail to improve my communication with friends/family
- 71. The ability of electronic mail to allow me to maintain contact with other institute participants
- 72. The availability of electronic mail access at home
- 73. The introduction to basic electronic mail functions common in all electronic mail networks--sending, receiving, forwarding, and filing mail during institute training
- 74. The availability of technical support from friends and/or family
- 75. The notification sent by the Resource Center to administrators expressing my need of support for electronic mail use to complete the final project
- 76. The availability of on-line support from the National K-12 Foreign Language Resource Center to answer technical questions
- 77. The success of all/most of the participants in my institute to obtain electronic mail access
- 78. The ability of electronic mail to improve my communication with colleagues

A = extremely significant  
B = very significant  
C = significant

D = moderately significant  
E = slightly significant  
F = not at all significant

79. The potential to use electronic mail to enhance my students' oral and written language skills
80. The ability to receive a fast reply to my message
81. The potential for my salary to increase in response to my computer capabilities
82. The ability of electronic mail to serve as an economical means of communication
83. The ability to send/receive/read messages anytime, day or night
84. The opportunity for supplementary evening practice at the Computation Center during institute training
85. The opportunity to have electronic mail training led by a foreign language educator during the institute
86. The success of all/most of the members of my institute project group to obtain electronic mail access
87. The availability of an electronic mail system that is relatively easy for me to use
88. The availability of electronic mail access at school
89. The ability to contact someone who is otherwise difficult to reach
90. The ability of electronic mail to provide me contact with teachers and students from around the world
91. The opportunity to increase my computer skills
92. The opportunity to participate in an electronic mail activity that could be used by my students
93. The opportunity for hands-on computer experience during the institute electronic mail training
94. The need to keep up with the latest technology trends in education
95. The ability of electronic mail to allow me to maintain contact with institute leaders
96. The recognition of being a technology-using educator
97. The availability of a modem from National K-12 Foreign Language Resource Center
98. The availability of technical support at school
99. The potential utilization of electronic mail in class by my students
100. The ability to save messages in a text format to edit later, if necessary

Thank you very much for taking time to fill out this questionnaire.  
Return only the answer sheet, not the questionnaire itself.

PLEASE DO NOT FOLD THE ANSWER SHEET.

RETURN THE ANSWER SHEET IN THE ENCLOSED STAMPED AND  
ADDRESSED ENVELOPE TO:

**National K-12 Foreign Language Resource Center  
300 Pearson Hall  
Iowa State University  
Ames, Iowa 50011**

**PLEASE MAIL BY APRIL 15, 1995**

APPENDIX D.  
QUESTIONNAIRE: NON-PARTICIPANTS

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COVER LETTER FOR ELECTRONIC MAIL USE QUESTIONNAIRE OF NON-  
PARTICIPANTS

March 30, 1995

Dear Foreign Language Educator,

The use of computer related technologies in the classroom is becoming an important issue in foreign language education today. The National K-12 Foreign Language Resource Center would like to know how you, as a foreign language educator are using computers. Also of very great interest to us is to what extent you are using electronic mail.

Would you please take about fifteen minutes of your time to complete the enclosed survey which addresses the following areas: background information, your attitude towards computer technology, and your use of computer technology and electronic mail.

Data collected from this survey will be used to prepare future institutes that will serve foreign language teachers like you.

Sincerely,

Marcia Rosenbusch  
Director



## **Survey of Technology and Electronic Mail Use By Foreign Language Educators**

This survey is designed to examine the factors that determine to what extent you, as a foreign language teacher, use computer technology and electronic mail. The survey items address the following themes: background information, attitude towards technology use, and your use of computer technology and electronic mail.

The results of this survey will assist the National K-12 Foreign Language Resource Center at Iowa State University in providing technology training that meets the needs of foreign language educators such as yourself. Results will be made available at request from the National K-12 Foreign Language Resource Center.

Your assistance is very much appreciated. All information that you supply will be kept strictly confidential. No individual will ever be identified in any reports. Thank you for your response.

**This survey should take approximately 15 minutes to complete.**

**Please return the answer sheet to this questionnaire in the enclosed stamped envelope to :**

**National K-12 Foreign Language Resource Center  
300 Pearson Hall  
Iowa State University  
Ames, Iowa 50011**

**PLEASE MAIL BY APRIL 15, 1995**

### **Filling Out the Green Answer Sheet:**

Please put all of your responses on the enclosed answer sheet, using a #2 pencil.

On the left side of side one of the answer sheet in the category IDENTIFICATION NUMBER please fill in the LAST 4 DIGITS of your social security number in A, B, C, D.

Please make no other marks on the left side of the answer sheet.

### Section I: Background Information

This section will be used to gather background information.

Please darken completely with your pencil the letter on your answer sheet that corresponds to the letter that represents your best answers each question.

1. What is your gender?
  - A. Female
  - B. Male
2. Which category represents your most recent degree?
  - A. BA/BS
  - B. MA/MS
  - C. PhD/EdD
3. In which age category do you fall?
 

A. 20-29	D. 50-59
B. 30-39	E. 60-over
C. 40-49	
4. How many years have you been a professional educator?
 

A. 1-5	E. 21-25
B. 6-10	F. 26-30
C. 11-15	G. 31 and over
D. 16-20	
5. What is your primary teaching assignment (**choose only one**)?
 

A. Elementary school teacher	E. Curriculum director
B. Middle school/ junior high teacher	F. Administrator
C. High school teacher	G. Other
D. K-12 teacher	
6. What foreign language is your **primary** teaching assignment (**choose only the one**)?
 

A. Chinese	E. Latin
B. French	F. Russian
C. German	G. Spanish
D. Japanese	H. Other
7. How long have you been using a computer?
 

A. I don't use a computer	F. 4 years
B. less than a year	G. 5 years
C. 1 year	H. 6 years
D. 2 years	I. 7 years
E. 3 years	J. more than 7 years

Please choose the response below that best represents how often you engage in the activities listed during a typical semester (approximately 18 weeks).

- A = 15 or more times per semester  
 B = 7 to 14 times per semester, or equivalent  
 C = 3 to 6 times per semester, or equivalent  
 D = 1 to 2 times per semester, or equivalent  
 E = never

8. I contact (by phone, letter, e-mail, etc.) teachers outside of my school but within my school district.
9. I contact (by phone, letter, e-mail, etc.) teachers outside of my school district.
10. I contact personnel of my local education agency or equivalent.
11. I attend educational conferences.
12. I use overhead transparencies in my classroom during instruction.
13. I use videotapes in my classroom during instruction.
14. I use audiotapes in my classroom during instruction.
15. I use a computer in my classroom for instructional purposes.

**Section II: Attitudes Towards Computer Related Technologies**  
 Responses to this section will indicate how you might adapt to using computer related technology. PLEASE MARK THE LETTER ON THE ANSWER SHEET THAT BEST DESCRIBES YOUR OPINION.

- |                    |                       |
|--------------------|-----------------------|
| A = strongly agree | D = slightly disagree |
| B = agree          | E = disagree          |
| C = slightly agree | F = strongly disagree |

16. Having a computer available to me would improve my productivity.
17. If I had to use a computer for some reason, it would probably save me some time and work.
18. I am aware that I am usually one of the last people in my group to accept something new.
19. If I used a computer, I could get a better picture of the facts and figures.
20. I am reluctant about adopting new ways of doing things until I see them working for people around me.
21. Having a computer available would improve my general satisfaction.
22. Having to use a computer could make my life less enjoyable.
23. I am generally cautious about accepting new ideas.

A = strongly agree  
B = agree  
C = slightly agree

D = slightly disagree  
E = disagree  
F = strongly disagree

24. Having to use a computer could make things easier for me.
25. I feel very negative about computers in general.
26. I rarely trust new ideas until I can see whether the vast majority of people around me accept them.
27. Having a computer available to me could make things more fun for me.
28. I find it stimulating to be original in my thinking and behavior.
29. I tend to feel that the old way of living and doing things is the best way.
30. If I had a computer at my disposal, I would try to get rid of it.
31. I look forward to a time when computers are more widely used.
32. I am challenged by ambiguities and unsolved problems.
33. I doubt if I would ever use computers very much.
34. I must see other people using new innovations before I will consider them.
35. I avoid using computers whenever I can.
36. I enjoy using computers.
37. I feel that there are too many computers around now.
38. I am challenged by unanswered questions.
39. Computers are probably going to be an important part of my life.
40. A computer could make learning fun.
41. If I were to use a computer, I could get a lot of satisfaction from it.
42. I often find myself skeptical of new ideas.
43. If I had to use a computer, it would probably be more trouble than it was worth.
44. I am usually uncomfortable when I have to use computers.
45. I sometimes get nervous just thinking about computers.

### Section III: Use and Potential Use of Computer Technology

Responses to this section will indicate how readily available technology is to you at home and at school. PLEASE FILL IN THE LETTER ON YOUR ANSWER SHEET THAT BEST REPRESENTS YOUR ANSWER.

A = strongly agree

B = agree

C = slightly agree

D = slightly disagree

E = disagree

F = strongly disagree

46. The use of computer related technologies by teachers is a high priority at my school.
47. My school administration believes that it is important for foreign language educators to be able to use computer related technologies.
48. My school administration believes that it is important for students to be able to use computer related technologies.
49. Necessary quality computer software and hardware are readily available to me at my school.
50. Technical assistance for computer related technologies is available when I need it .
51. My school/school district provides the training I need to effectively use computer related technologies.
52. My colleagues give me the support I need regarding the use of computer related technologies in instruction.
53. I believe I have positive support from my administrators regarding the use of computer related technologies in instruction.
54. I intend to integrate computer related technologies into my teaching in the near future.

The following questions relate to your use or non-use of electronic mail. Electronic mail is a message, typed by the sender on a computer, then transmitted electronically to the receiver's computer where it is read at the receiver's convenience.

55. Please indicate the number of hours of formal electronic mail training you have had over the past two years. (This should NOT include general Internet training, just electronic mail training.)
 

A. No formal electronic mail training	F. 7-8 hours
B. less than an hour	G. 9-10 hours
C. 1-2 hours	H. 11-12 hours
D. 3-4	I. 13 or more hours
E. 5-6 hours	

56. Please choose a single answer corresponding to the statement that most nearly represents the **present** status of your use of electronic mail:
- A. I know nothing about electronic mail.
  - B. I know about electronic mail, but lack complete information.
  - C. I am interested in electronic mail, but lack complete information.
  - D. I have evaluated the use of electronic mail and have decided it will work for me, but have not had the opportunity to use it.
  - E. I have evaluated the use of electronic mail and have decided it will not work for me.
  - F. I have tried using electronic mail. (Any attempt is counted as a trial).
  - G. I use and will continue to use electronic mail.
57. I have access to an electronic mail account.
- A. yes
  - B. no

If your answer was "YES" to question #57, PLEASE CONTINUE TO ANSWER THE REMAINDER OF THE QUESTIONNAIRE.

If your answer was "NO" to the previous question (#57), you have finished the survey. Thank you for taking your time to fill out this questionnaire. Please return the answer sheet in the enclosed, self-stamped envelope. **DO NOT FOLD THE ANSWER SHEET.** (It is not necessary to return the questionnaire.)

58. I have had my electronic mail account for:
- A. less than a month
  - B. 1-3 months
  - C. 4-6 months
  - D. 7-9 months
  - E. 10-12 months
  - F. over a year
59. My primary electronic mail service provider is
- A. my school, region or state
  - B. a college or university
  - C. a freenet
  - D. America Online
  - E. Prodigy
  - F. CompuServe
  - G. Delphi
  - H. another commercial service
  - I. Minitel Services Company
  - J. I don't know
60. In an average week I send the following number of messages
- A. I have an electronic mail address but do not send messages regularly
  - B. 0-1 message a week
  - C. 2 messages a week
  - D. 3-4 messages a week
  - E. 5-7 messages a week
  - F. 8-10 messages a week
  - G. more than 10 messages a week

Please answer the following questions with:

A =yes

B =no

61. I personally pay for my electronic mail account.
62. I share my account and password with other faculty members.

A =yes

B =no

- 63. I primarily access my electronic mail account from school.
- 64. I primarily access my electronic mail account from home.
- 65. I belong to at least one newsgroup.
- 66. I belong to at least one listserv.
- 67. I use Internet services (e.g. telnet, archie, gopher, World-Wide Web/Mosaic/Netscape) as well as electronic mail.
- 68. My students use electronic mail in my class(es).
- 69. My students use the Internet in my class(es).

**Section IV: Influence of Electronic Mail Characteristics that Affect the Use of Electronic Mail by Foreign Language Educators**  
 Responses to this section will indicate the significance a particular characteristic of electronic mail had on your eventual use of electronic mail.

For each number please select the response that best describes significance each characteristic had on your decision to use electronic mail during the past 8-10 months.

**PLEASE ANSWER ACCORDING TO THE SCALE BELOW:**

A = extremely significant

B = very significant

C = significant

D = moderately significant

E = slightly significant

F = not at all significant

- 70. The ability to send/read messages anytime, day or night
- 71. The ability to receive a fast reply to my message
- 72. The ability to contact someone who is otherwise difficult to reach
- 73. The ability to save messages in a text format to edit later, if necessary
- 74. The ability of electronic mail to improve my communication with friends/family
- 75. The ability of electronic mail to improve my communication with colleagues
- 76. The ability of electronic mail to provide me contact with teachers and students from around the world.
- 77. The ability of electronic mail to serve as an economical means of communication
- 78. The availability of electronic mail access at school

A = extremely significant  
B = very significant  
C = significant

D = moderately significant  
E = slightly significant  
F = not at all significant

79. The recognition of being a technology-using educator
80. The opportunity to increase my computer skills
81. The potential for my salary to increase in response to my computer capabilities
82. The availability of an electronic mail system that is relatively easy for me to use
83. The potential utilization of electronic mail in class by my students
84. The availability of electronic mail access at home
85. The availability of technical support at school
86. The availability of technical support from friends and/or family
87. The need to keep up with the latest technology trends in education
88. The potential to use electronic mail to enhance my students' oral and written language skills

Thank you very much for taking time to fill out this questionnaire.  
Return only the answer sheet, not the questionnaire itself.

PLEASE DO NOT FOLD THE ANSWER SHEET.

RETURN THE ANSWER SHEET IN THE ENCLOSED STAMPED AND  
ADDRESSED ENVELOPE TO:

**National K-12 Foreign Language Resource Center  
300 Pearson Hall  
Iowa State University  
Ames, Iowa 50011**

**PLEASE MAIL BY APRIL 15, 1995**



APPENDIX E.  
FOLLOW-UP LETTER FOR NON-PARTICIPANTS

April 24, 1995

Dear (Name of subject),

Two weeks ago you should have received our Survey of Technology and Electronic Mail Use by K-12 Foreign Language Educators. Our records show that you have not yet returned the survey.

We realize that as an educator you are very busy during this time of year, but it is your dedication to the foreign language profession that makes your input in our research so important.

Could you please return the survey as soon as possible. If you have any questions, please call me: 515-225-6026

Sincerely,

Janine Shelley  
Technology Coordinator  
National K-12 Foreign Language  
Resource Center

APPENDIX F.  
FREQUENCY DISTRIBUTION OF QUESTIONNAIRE ITEMS

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**A. BACKGROUND**

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
<b>GENDER</b>						
Female	64	54	84.38	64	52	81.25
Male		10	15.62		12	18.75
<b>EDUCATION</b>						
BA / BS	64	12	18.75	64	16	25.00
MA / MS		46	71.88		44	68.75
PHD/EdD		6	9.38		4	6.25
<b>AGE</b>						
20-29	64	1	1.56	62	3	4.84
30-39		18	28.13		10	16.13
40-49		29	45.31		30	48.39
50-59		15	23.44		19	30.65
60-over		1	1.56		0	0.00
<b>YEARS OF TEACHING</b>						
1-5	64	5	7.81	64	5	7.81
6-10		8	12.5		9	14.06
11-15		12	18.75		6	9.34
16-20		16	25.00		21	32.81
21-25		13	20.31		10	15.63
26-30		8	12.50		10	15.63
31 and over		2	3.13		3	4.69
<b>TEACHING ASSIGNMENT</b>						
Elementary	64	14	21.88	64	9	14.06
Middle school/ junior high		8	12.50		10	15.63
High School		28	43.75		35	54.69
K-12 Teacher		4	6.25		4	6.25
Curriculum Dir.		5	7.81		3	4.69
Administrator		2	3.13		2	3.13
Other		3	4.69		1	1.56

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
FOREIGN LANGUAGE TAUGHT						
Chinese	64	1	1.56	64	1	1.56
French		21	32.81		23	35.94
German		5	7.81		3	4.69
Japanese		5	7.81		4	6.25
Latin		1	1.56		0	0.00
Russian		2	3.13		0	0.00
Spanish		28	43.75		32	50.00
Other		1	1.56		1	1.56
COMPUTER USE						
None	64	0	0.00	63	3	4.76
less than a year		4	6.25		3	4.76
1 year		4	6.26		2	3.17
2 years		4	6.26		7	11.11
3 years		4	6.25		9	14.29
4 years		5	7.81		2	3.17
5 years		2	3.13		9	14.29
6 years		7	10.94		3	4.76
7 years		7	10.94		1	1.59
more than 7 yrs		27	42.19		24	38.10

**TEACHER CONTACT WITH TEACHERS**

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
Contact with teachers outside of the school but within the school district	64	34	53.13	63	18	28.57
		12	18.75		9	14.29
		9	14.06		15	23.81
		5	7.81		18	28.57
		4	6.25		3	4.46
Contact with teachers outside of school district	64	32	50.00	64	18	28.13
		14	21.86		12	18.75
		13	20.31		13	20.31
		3	4.69		15	23.44
		2	3.13		6	9.38
Contact with personnel at local education agency	64	12	18.75	64	5	7.81
		11	17.19		9	14.06
		4	6.25		13	20.315
		13	20.31		20	31.25
		23	35.94		17	26.56
		1	1.56		0	0.00
Attendance at educational conferences	64	1	1.56	64	3	4.69
		2	3.13		4	6.25
		14	21.88		13	20.31
		40	62.50		44	68.75
		7	10.94		0	0.00

1 = 15 or more times per semester	4 = 1 to 2 times per semester
2 = 7 to 24 times per semester	5 = once a year
3 = 3 to 6 times per semester	6 = never

**TEACHERS' USE OF INSTRUCTIONAL TECHNOLOGY**

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
Use of overhead transparencies	63	35	55.56	64	35	54.69
		8	12.70		12	18.75
		4	6.35		6	9.38
		7	11.11		8	12.50
		9	14.29		3	4.69
Use of videotapes	63	21	33.33	64	24	37.50
		17	26.98		16	25.00
		17	26.981		22	34.38
		7	11.111		2	3.13
		1	1.59		0	0.00
Use of audiotapes	63	40	63.49	64	34	53.13
		9	14.29		12	18.75
		7	11.11		13	20.31
		6	9.52		4	6.25
		1	1.59		1	1.56
Use of a computer for instructional purposes	63	16	25.40	63	9	14.29
		8	12.70		5	7.94
		5	7.94		11	17.46
		6	9.52		7	11.11
		28	44.44		31	49.21

1 = 15 or more times per semester

2 = 7 to 24 times per semester

3 = 3 to 6 times per semester

4 = 1 to 2 times per semester

5 = once a year

6 = never

**TEACHERS' SCHOOL SUPPORT OF USE OF COMPUTER TECHNOLOGY**

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Mean	SD	N	Mean	SD
Use of computer-related technologies by teachers is a high school priority	64	2.66	1.49	63	2.51	1.40
School administration believes it is important for foreign language educators to be able to use computers related technologies.	64	2.55	1.36	63	2.90	1.66
School administration believes that it is important for students to be able to use computer related technologies.	64	1.89	1.09	64	1.76	1.32
Necessary quality computer software and hardware are readily available to the teacher at school.	64	3.72	1.45	64	3.60	1.73
Technical assistance for computer related technologies is available when the teacher needs it.	64	3.38	1.51	63	2.98	1.58
School/school district provides the trained needed to effective use computer related technologies.	64	3.48	1.49	62	3.08	1.54
Colleagues give needed support regarding the use of computer related technologies in instruction.	64	3.08	1.43	62	2.89	1.39
1 = strongly agree			4 = slightly disagree			
2 = agree			5 = disagree			
3 = slightly agree			6 = strongly disagree			



Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Mean	SD	N	Mean	SD
Administrators give positive support regarding the use of computer related technologies.	64	2.59	1.33	63	2.43	1.27
Teacher intends to integrate computer related technologies into teaching in the near future.	64	1.92	1.23	63	1.68	1.01

1 = strongly agree	4 = slightly disagree
2 = agree	5 = disagree
3 = slightly agree	6 = strongly disagree

**NUMBER OF HOURS OF FORMAL ELECTRONIC MAIL TRAINING  
TEACHERS HAVE HAD OVER THE PAST TWO YEAR**

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
	64			64		
No formal training		0	0.00	43	67.19	
less than 1 hour		0	0.00	7	10.94	
1-2 hours		1	1.56	6	9.38	
3-4 hours		0	0.00	3	4.69	
5-6 hours		35	54.69	1	1.56	
7-8 hours		10	28.13	1	1.56	
9-10 hours		2	3.13	0	0.00	
11-12 hours		4	6.25	0	0.00	
13 or more hours		4	6.25	3	4.69	

**PRESENT STATUS OF ELECTRONIC MAIL USE BY FOREIGN LANGUAGE TEACHERS**

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
	64			64		
Knows nothing about electronic mail		1	1.56		9	14.06
Knows about electronic mail, but lack complete information		0	0.00		6	9.38
Is interested in electronic mail but lacks complete information		1	1.56		11	17.19
Has evaluated the use of electronic mail and has decided it will work for him/her, but has not used it		3	4.69		6	9.38
Has evaluated the use of electronic mail and has decided it will not work for him/her		0	0.00		0	0.00
Has tried using electronic mail		8	12.50		5	7.81
Uses and will continue to use electronic mail		51	79.69		27	42.19

**TEACHERS' ACCESS TO AN ELECTRONIC MAIL ACCOUNT**

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
	64			63		
Yes		59	92.19		36	57.14
No		5	7.81		27	42.86

## TEACHERS' ELECTRONIC MAIL USE STATUS

Length of time the individual has had an electronic mail account:

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
	58			35		
less than a month		0	0.00		5	14.29
1-3 months		4	6.90		7	20.00
4-6 months		16	27.57		4	11.43
7-9 months		21	36.21		2	5.71
10-12 months		1	1.72		0	0.00
over a year		16	27.59		17	48.57

Primary Service provider:

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
	58			36		
school, region, or state		20	34.48		14	38.89
college/ university		11	18.97		8	22.22
freenet		3	5.17		0	0.00
America Online		17	29.31		6	16.67
Prodigy		1	1.721		1	2.78
CompuServe		4	6.90		2	5.56
Delphi		0	0.00		0	0.00
another commercial service		2	3.45		1	2.78
Minitel Services Company		0	0.00		2	5.56
doesn't know		0	0.00		2	5.56

## Average number of messages sent a week:

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
	58			37		
has an e-mail address but does not send messages regularly	7	12.07		10	27.02	
0-1 messages a week	4	6.90		6	16.22	
2 messages a week	7	12.07		3	8.11	
3-4	15	25.86		4	10.81	
5-7	13	22.41		5	13.51	
8-10	1	1.72		1	2.70	
10 or more	11	18.97		8	21.62	

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
<b>Personally pays for account:</b>	58			36		
Yes		27	46.55		13	36.11
No		31	53.45		23	63.89
<b>Shares account and password with other faculty</b>	58			36		
Yes		5	8.62		4	11.11
No		53	91.38		32	88.89
<b>Primarily accesses account from school</b>	58			36		
Yes		24	41.38		13	36.11
No		34	58.62		23	63.89
<b>Primarily accesses account from home</b>	58			36		
Yes		33	56.90		20	55.56
No		25	43.10		16	44.44
<b>Belongs to at least one newsgroup</b>	58			36		
Yes		16	27.59		14	38.89
No		42	72.41		22	61.11
<b>Belongs to at least one listserv</b>	57			36		
Yes		28	49.12		11	30.56
No		29	50.88		25	69.44
<b>Uses Internet services as well as electronic mail</b>	57			37		
Yes		30	52.63		23	62.16
No		27	47.37		14	37.84

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Freq.	%	N	Freq.	%
Teacher's students use electronic mail in class	58			37		
Yes		14	24.14		7	18.92
No		44	75.86		30	81.08
Teacher's students use the Internet in class	58			37		
Yes		9	15.52		9	16.22
No		49	84.48		31	83.78



# **SIGNIFICANCE OF ELECTRONIC MAIL CHARACTERISTICS ON ADOPTION OF ELECTRONIC MAIL BY TEACHERS**

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Mean	SD	N	Mean	SD
Need to keep up with the latest technology trends in education*	58	1.48	.86	36	1.92	1.25
Availability of an electronic mail system that is relatively easy to use	58	1.60	.95	36	1.89	1.30
Ability to receive a fast reply *	58	1.71	.97	36	2.31	1.45
Opportunity to increase computer skills	58	1.88	1.14	36	2.06	1.17
Ability of electronic mail to provide contact with teachers and students from around the world.	58	1.91	1.39	36	1.67	1.15
Ability to contact someone who is otherwise difficult to reach	58	1.97	1.42	36	1.92	1.16
Ability of electronic mail to improve communication with colleagues	58	1.98	1.16	36	2.06	1.39
Ability to send/read messages anytime, day or night	58	2.07	1.46	34	2.18	1.49
Potential utilization of electronic mail in class by students	58	2.12	1.50	36	2.25	1.44
1 = extremely significant			4 = moderately significant			
2 = very significant			5 = slightly significant			
3 = significant			6 = not at all significant			

Category	PARTICIPANTS			NON-PARTICIPANTS		
	N	Mean	SD	N	Mean	SD
Recognition of being a technology-using educator	58	2.24	1.44	36	3.01	1.80
Ability of electronic mail to serve as an economical means of communication	58	2.41	1.56	36	1.94	1.39
Ability to save messages in a text format to edit later, if necessary	58	2.67	1.73	36	2.31	1.53
Availability of electronic mail access at school	58	2.69	1.95	36	2.56	1.87
Availability of electronic mail access at home	58	2.69	1.92	36	2.19	1.65
Ability of electronic mail to improve communication with friends/ family	58	2.97	1.97	36	2.31	1.72
Potential to use electronic mail to enhance students' oral and written language skills*	58	2.99	1.83	35	1.94	1.43
Availability of technical support at school*	58	3.26	1.86	36	2.42	1.92
Availability of technical support from friends and/or family	58	3.57	1.78	36	3.11	1.92
Potential for salary increase in response to computer capabilities	57	5.16	1.59	36	4.17	1.87
1 = extremely significant			4 = moderately significant			
2 = very significant			5 = slightly significant			
3 = significant			6 = not at all significant			

**SIGNIFICANCE OF INSTITUTE ELECTRONIC MAIL TRAINING  
CHARACTERISTICS ON ADOPTION OF ELECTRONIC MAIL BY PARTICIPANTS**

Category	PARTICIPANTS		
	N	Mean	SD
Opportunity for hands-on computer experience during the institute electronic mail training	58	1.64	1.12
Ability of electronic mail to maintain contact with institute leaders	58	1.91	1.20
Opportunity to have electronic mail training led by a foreign language educator during the institute	58	2.19	1.34
Introduction to basic electronic mail functions common in all electronic mail networks	58	2.21	1.51
Opportunity to participate in an electronic mail activity that could be used by students	58	2.24	1.59
Ability of electronic mail to maintain contact with other institute participants	58	2.31	1.34
Success of all/ most of the members of institute project group to obtain electronic mail access	58	2.41	1.20
<hr/>			
1 = extremely significant		4 = moderately significant	
2 = very significant		5 = slightly significant	
3 = significant		6 = not at all significant	

Category	PARTICIPANTS		
	N	Mean	SD
Success of all/most of institute participants to obtain electronic mail access	57	2.65	1.30
Opportunity for supplementary evening practice at the computation center during institute training	57	3.29	1.89
Availability of on-line support from the national k-12 foreign language resource center	58	3.41	1.89
Notification sent to administrators expressing need of support for electronic mail use to complete the final project	58	4.12	1.73
Availability of a modem from the resource center	56	4.20	2.14

1 = extremely significant  
 2 = very significant  
 3 = significant

4 = moderately significant  
 5 = slightly significant  
 6 = not at all significant

**APPENDIX G**

**NFLRC DEVELOPED ELECTRONIC MAIL TRAINING MATERIALS**

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## Computer Mediated Communication in Foreign Language Education

Janine Onffroy Shelley

National K-12 Foreign Language Resource Center  
Iowa State University



### Main Point of this Presentation

- What is Computer Mediated Communication
- Types of networks
  - Local Area Network (LAN)
  - Internet
- How can CMC enhance foreign language education
- Tips on successful lesson preparation
- Factors in successful adoption of CMC?

### Types of Technology Useful in Foreign Language Education

#### Computer assisted learning

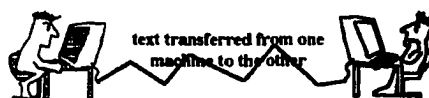
- Drill and practice software programs
- Interactive multimedia software

#### Telecommunications

- Computer mediated communication
  - Electronic Mail
  - Local area networks
  - Internet
- Distance Education

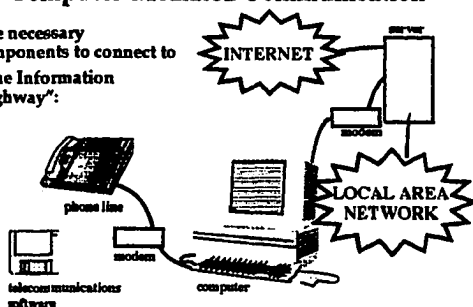
### Computer Mediated Communication

Computer mediated communication is a form of communication that uses a computer network like a telephone exchange. Rather than transmitting information in the form of voice, interactive telecommunications transmits information in the form of text and graphics by means of a computer linked to a modem and telephone system.



### Computer Mediated Communication

The necessary components to connect to "The Information Highway":

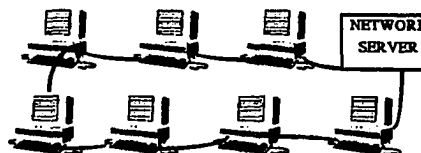


### Communicating Over a Local Area Network

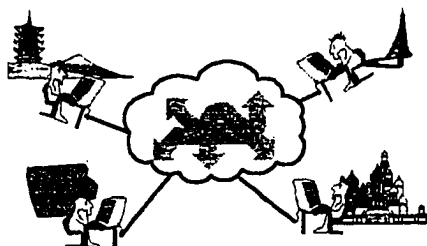
Definition of a local area network (LAN):

Computers that are linked together in a single room or school. With the correct program users are able to "chat" with each other on-line.

(Research of Beauvois, Kern, Munn and Kelton, '93)

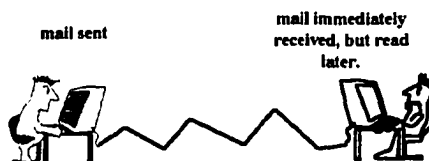


### The Internet



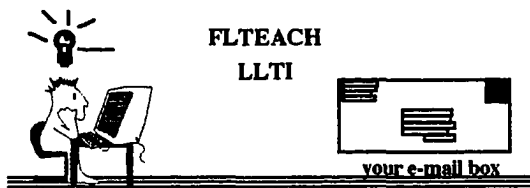
### Electronic Mail

**Definition:** A message typed on a computer that is transmitted to another computer where it is held until the person for whom it is intended decides to read it using a computer.



### Listsersvs

Also a forum where people share ideas, but the messages arrive in your e-mail box



### Newsgroups

A forum for people with shared interests to exchange ideas.

- Professional collegiality
- Means for students to share ideas

Several newsgroups that might interest foreign language educators:

- ia.org.eee: for Iowa educators
- k12.lang.deutsch-eng
- k12.lang.esp-eng
- k12.lang.francais
- k12.lang.russian



### World Wide Web

A way to navigate the Internet that allows one to easily locate and retrieve information. That information, in the form of documents (text, graphics, sound, and video) could come from anywhere in the world.



### Technology and Teaching

"Good teachers ... focus on activities that cause students to process information in unique ways that deepen understanding. Effective teaching rarely embodies simple telling and is rarely limited to the transmission of formal knowledge."  
(Berliner, 1990)

*Technology offers new approaches to teaching and learning in foreign language education.*

### Whole Language approach influence on foreign language education

- ❑ Language develops naturally and is therefore a social phenomena used for communication purposes
- ❑ Language learning and teaching must be personalized in order to meet the needs and interests of each learner
- ❑ Language learning is considered to be a part of making sense of the world; language therefore does not need to be learned separately first, but rather is learned holistically in context

Bergson '90

### Goals of the Foreign Language Educator

The foreign language curriculum today is proficiency oriented. Students are encouraged to speak, listen, write and read.



### Opportunities should be provided in the F.L. Classroom:

1. for students to practice using language in a range of contexts likely to be encountered in the target culture
2. to practice carrying out a range of functions likely to be necessary in dealing with others in the target culture.
3. that encourage the development of linguistic accuracy.
4. that respond to the students' affective needs as well as their cognitive needs.
5. that promote cultural understanding of target culture.

*Alice Omaggio-Hadley's planning strategies for teaching speaking skills (86)*

### Goals of the foreign language task force

- ❑ Developing insight into one's own language and culture, acquiring new knowledge and connecting with other disciplines
- ❑ Acquiring new knowledge and connection with other disciplines
- ❑ Participating more fully in the community and global marketplace
- ❑ Demonstrating knowledge of artifacts, expressions and traditions of the target cultures

### How can computer mediated communication assist in meeting foreign language objectives?

#### Research says:

- ❑ A real audience improves student writing (Riel, '92)
- ❑ Freer communication with teachers (Moore, '91)
- ❑ Grammar books as reference tools lead to greater retention (Dvorak, '86)
- ❑ Student language production is increased over a network (Kern, '93)
- ❑ Student attitudes are improved (Beauvois, '93)
- ❑ Performance anxiety is decreased (Beauvois, '93)

### Things to consider when planning a lesson:

- ❑ Integration of the lesson into an existing curriculum
- ❑ Central theme for the lesson
- ❑ Avoid pen-pal only projects
- ❑ Network with more than one, or even two, other classrooms
- ❑ Have a well-defined group project with a beginning and ending date and a written product
- ❑ Make your network part of a larger framework



**More things to consider:**

- ❑ Take advantage of the cultural or regional diversity represented by the network partners
- ❑ request for information from distant classes should be reasonable in scope
- ❑ information collected should be of interest to a wide audience of students, teachers, parents, and others

**More things to consider:**

- ❑ Logistics for using the computer
- ❑ Cost of service(s) and average cost per student

**An Example of a Successful Message Exchange**

- ❑ Breck Middle School, Minneapolis, Minnesota  
12 and 13 year-old students in a private middle school
- ❑ Paul Dukas elementary school, Brest, France  
10 and 11 year-old students in a public school from an underprivileged neighborhood
- ❑ The product of the exchange was a play written and produced by students from both schools. The play was presented April, 1993.

**General Factors Affecting the acceptance of CMC**

- ❑ Teachers' perception of CMC as both necessary and relevant
- ❑ Clarity of what is to be gained from its adoption
- ❑ Software and hardware must be available when needed and must be of high quality
- ❑ Principal must be actively supportive
- ❑ Level of collegiality, trust, support, interaction, and open communication between teachers is important
- ❑ Teachers must perceive that CMC is efficient
- ❑ External assistance when needed must be available

**But Most Important,  
teachers must be able  
to first use the  
technology  
themselves!!!!**

# Instructions for Iowa State's Vincent Network

Prepared by Janine Onffroy Shelley

```
Project Vincent / ULTRIX U4.3A (Rev. 145) (las2.iastate.edu)
login: joshelle
password: █
```

Sign in at the *login* prompt. On campus you do not need the @iastate.edu.

```
Starting Zephyr client in ttymode...
Checking for mail...
You don't have any mail waiting on FS-1.IASTATE.EDU

vincent%
vincent% easy█
```

At *vincent%* prompt type *easy*.

## SEND AND READ MAIL: Choosing Electronic Mail

```
EasyVincent Version 2.1 - Main Menu

1) Exit EasyVincent
-> 2) Electronic Mail
3) Usenet News
4) Work with files
5) Connect to an information service
6) Get help on using Project Vincent
7) Connect to another host computer
8) Set your preferences
9) Make suggestions/comments relating to EasyVincent
10) About EasyVincent

[Alt] h)help q)uit u)p b)egin e)nd r)efresh
```

Type 2 to go to *Electronic Mail*, hit Return. Note the directions at the bottom of the page. **Control** (hold down the Control key):

- *h* will give you the help menu,
- *q* will quit *EasyVincent*,
- *u* will take you to the previous menu,
- *b* will put the cursor at the top of the page,
- *e* will put the cursor at the end of the page,
- *r* will clean up the screen (important when you receive a message while you are working on a message).

#### TO SEND MAIL:

```

EasyVincent -- Electronic Mail

1) Read old (unfiled) mail in your "inbox" (13 pieces)
2) Read old mail filed in folders
-> 3) Send mail
4) Work with draft mail (8 pieces)
5) Work with the last piece of mail you sent
6) Delete mail
7) Maintain personal mail directory
8) Maintain mail folders
9) Search mail folders
10) Change your mail signature
11) Check the post office for new mail

```

Type 3 to send mail, then hit Return.

```

To: Electronic Mail Address Entry

1) Look up an "iastate.edu" e-mail address
-> 2) Enter a known e-mail address

```

Type 2 to enter a known e-mail address, then hit Return.

```

To: dgross

```

Type the "address" of the person to whom you want to send a message. If that person is at Iowa State University, you do not need the *@istate.edu* part of the address.

```
Mail "To:" info - Personal Mail Directory
-> 1) (Done with To: recipient selections)
    2) (Use an e-mail address not in my personal directory)
```

Type *1* to continue, then hit Return.

```
Do you want to "carbon copy" this to anyone? (y|n|q) n
Do you want to "blind carbon copy" this to anyone? (y|n|q) n
Subject: Hello
```

You are asked if you want to send copies of this message to someone else. Type *n* for each question if you do not want to sent copies. Then type the subject of your message

```
/home/joshelle/ esqumment/draft body (Modified) Hit Ctrl-K H for help
This is my first time using email.

---
Janine Onffroy Shelley
Iowa State University
Ames, Iowa 50311
515-294-4046
```

Here is my message. Note that if you need help with editing instructions hit CONTROL kh. At the end of my message is my "signature" that is automatically added. When you are finished hit CONTROL kx to SEND the message.

- ```

-> 1) Send it
    2) List it
    3) Examine/change the mail header information
    4) Edit the body of the letter again
    5) Append a file or mail item to your letter
    6) Spell-check it
    7) Save it as a draft for later
    8) Delete it

```

You will see this menu. Hit RETURN and your letter will be sent.

- ```

EasyVincent -- Electronic Mail

    1) Read old (unfiled) mail in your "inbox" (13 pieces)
    2) Read old mail filed in folders
-> 3) Send mail
    4) Work with draft mail (8 pieces)
    5) Work with the last piece of mail you sent
    6) Delete mail
    7) Maintain personal mail directory
    8) Maintain mail folders
    9) Search mail folders
   10) Change your mail signature
   11) Check the post office for new mail

```

You will be taken back to this menu. Type *u* to go up to the previous menu, so that you will be able to logout.

## TO READ MAIL

- ```

EasyVincent -- Electronic Mail (You have unread mail)

-> 1) Read new (unread) mail (1 piece)
    2) Read old (unfiled) mail in your "inbox" (14 pieces)
    3) Read old mail filed in folders
    4) Send mail
    5) Work with draft mail (8 pieces)
    6) Work with the last piece of mail you sent
    7) Delete mail
    8) Maintain personal mail directory
    9) Maintain mail folders
   10) Search mail folders
   11) Change your mail signature
   12) Check the post office for new mail

```

At the top of the screen you will see that you have unread mail. **1** indicates that you have one piece of mail. To read mail, type **1** and hit Return. ( When "1" is already selected as it is here, just hit Return)

```
-> 1) <Done with selections>
    2) [ 1 06/08/94 dgross@iastate Janine, this is really important.
```

The message, who sent it, and its subject is listed. If there were more messages, they would be shown also. Type the number of the message (2 in this case) then type **RETURN** to select it, as in the next example. You would do this for each message you want to read.

```
                                READ Mail - Mail folder "inbox"
-> 1) <Done with selections>
    2) [X] 06/08/94 dgross@iastate Janine, this is really important.
```

When you have finished marking messages, hit **1** and then Return to read them. To unmark a message, select its number and hit Return.

```
                                READ Mail - Mail folder "inbox"
-> 1) <Done with selections>
    2) [X] 06/08/94 dgross@iastate Janine, this is really important.
```

Then type **1** to read the messages you have selected.

```

id AA02342; Wed, 8 Jun 1994 10:19:59 -0500
Received: from vincent1.iastate.edu by mailhub.iastate.edu
id AA29421; Wed, 8 Jun 1994 10:20:01 -0500
Received: by vincent1.iastate.edu with sendmail-5.65
id <AA08839@vincent1.iastate.edu>; Wed, 8 Jun 1994 10:19:57 -0500
Message-Id: <9406081519.AA08839@vincent1.iastate.edu>
To: joshelle@iastate.edu
Subject: Janine, this is really important.
X-Mailer: EasyVincent 2.2
Date: Wed, 08 Jun 1994 10:19:57 CDT
From: Dena G Gross <dgross@iastate.edu>

```

rHello, Janine!

Good luck with your e-mail project for the National K-12 Center. It sounds so exciting!!! Just think of all those educators who will have such a vast expanse of resources available to them through e-mail. Cool.

Dena Gross

[Press any key to continue]

This is what your email message will look like. It will have the date and time sent and received, names of computers servers involved, and the address of the receiver. After reading it, push any key to continue, as noted at the bottom.

```

                                Select action for item 101 in "inbox"

1) Do nothing (leave in folder "inbox")
2) Display it again
-> 3) Reply to it
4) Forward it to someone else
5) File it in a folder
6) Print it
7) Extract it to a file
8) Get more info on sender (via "finger")
9) Add sender to personal mail directory
10) Delete it

```

You will see this screen. Type 3 and hit return to reply to the message.

Do you want to "carbon copy" this to anyone? <y|n|q> n  
 Do you want to "blind carbon copy" this to anyone? <y|n|q> n  
 Do you want to imbed the original text sent to you? <y|n|q> y

You are asked if you want to send copies of your response to anyone. Type *n*. If you want a copy of the original text to appear in your response, type *y*.

```
/home/joshelle/ easynrcent/draft_body (Modified)      Hit Ctrl-H for help
> rHello, Janine!
>
> Good luck with your e-mail project for the National K-12 Center.  It sounds
> so exciting!!!  Just think of all those educators who will have such a vast
> expanse of resources available to them through e-mail.  Cool.
>
> Dena Gross
>

Thanks for the message Dena.  Telecommunications can be a very powerful
teaching tool.

Janine
---
Janine Onffroy Shelley
Iowa State University
Ames, Iowa 50311
515-294-4046
```

The > indicates copied text. Your cursor will be at the top of the screen. To move the cursor down below the copied text use the down arrow( ↓ ) on your computer. When finished with the message, hold down the Control key and type kx.

```
Ready to mail letter.  What now?
-> 1) Send it
    2) List it
    3) Examine/change the mail header information
    4) Edit the body of the letter again
    5) Append a file or mail item to your letter
    6) Spell-check it
    7) Save it as a draft for later
    8) Delete it
```



You will see this screen. Hit Return to send the letter.

```
                Select action for item 101 in "inbox"

1) Do nothing (leave in folder "inbox")
2) Display it again
3) Reply to it
4) Forward it to someone else
-> 5) File it in a folder
6) Print it
7) Extract it to a file
8) Get more info on sender (via "finger")
9) Add sender to personal mail directory
10) Delete it
```

You will then see this menu. To keep a copy of the letter in a folder instead of deleting it type 5 then hit Return.

```
                Re-file Mail Item - Select folder

-> 1) (Create a new folder)
2) Conferences (1 piece)
3) Copies of mail sent (empty)
4) EEE (5 pieces)
5) French 102 spring94 (39 pieces, 1 subfolder)
6) Minitel (4 pieces)
7) NLRC-List (7 pieces)
8) Resource Center (5 pieces)
9) Tech job possibilities (2 pieces)
10) Technology Grant (empty)
```

Choose the number of the folder you have already created or create a new folder. To create a new folder type 1, and hit Return. This example has 9 folders created.

```

Create New Mail Folder - Select folder location
-> 1) <Add a new top-level folder>
    2) Conferences <1 piece>
    3) EEE <5 pieces>
    4) French 102 spring94 <39 pieces, 1 subfolder>
    5) Minitel <4 pieces>
    6) NLRC-List <7 pieces>
    7) Resource Center <5 pieces>
    8) Tech job possibilities <2 pieces>
    9) Technology Grant <empty>

```

Type **1** , then hit Return.

```

Mail Folder Creation
Enter name of new mail folder.
<Abort by just pressing "Return">
Folder name: Partnership Institute

```

Here, write the name of your folder. Ours is *Partnership Institute*. Your message is automatically saved into this folder. If you are done with your email session, type **u** to back out of Email to arrive at the next screen.

```

EasyVincent Version 2.1 - Main Menu
-> 1) Exit EasyVincent
    2) Electronic Mail
    3) Usenet News
    4) Work with files
    5) Connect to an information service
    6) Get help on using Project Vincent
    7) Connect to another host computer
    8) Set your preferences
    9) Make suggestions/comments relating to EasyVincent
    10) About EasyVincent

```

Type **1** to exit EasyVincent, and hit Return.

At the *vincent%* prompt, type *logout*.

## **CMC On Site Activity For Institute Participants**

You are not sitting together in the same location, but in your office in your particular state.

You and two or three of your colleagues in other "states" must prepare a joint report on a topic of your choice. You do not have the time to use regular mail service and cannot use the phone or fax. You will use Email for all of your research and discussions. (You will meet for a short time before this project to decide the logistics for group management and to decide on your "research topic").

You will send Email messages to the participants of this Institute, and may use any other Email contacts you may have, to gather your data. You and your group must evaluate, discuss and produce a final oral report based on the data you gather using only Email. (*Do not discuss this project outside of this room!*) You will have a limited amount of time to complete this activity so try to limit your data gathering to three other sources per group member.

Prepare an oral group report that you will present together in class on Thursday.

**Post-Institute Collaborative Project  
New Technologies Institute Participants  
(to be executed using Email)**

The mission of this Institute is to facilitate collaboration among foreign language teachers interested in technology. This final project is designed to give participants the opportunity to work jointly on a topic of concern to them related to the use of technology in foreign language programs.

Institute participants will work in groups of three to five to explore or research a topic of mutual interest relating to the use of technology in foreign language education. (e.g. uses of the Internet or particular software in the foreign language classroom). Projects could also include student interaction.

The description and results of each project will be prepared in written format and will be completed by the following January. Copies of each report will be mailed to fellow participants. Selected project reports will be edited and made available on the Educational Resources Information Center (ERIC) database and other sources.

Participants for each project will correspond regularly with group members using Electronic Mail (Email).

**Requirements and deadlines for this project**

Each participant will:

- have access to a computer, modem, and Email service (Internet, America Online, CompuServe, etc.) by September 15.
- send an Email address to Janine by September 15
- check for Email messages at least three times a week to assure regular communication with other participants
- send an Email message to team members at least once a week
  - about material directly related to the project
  - about what is going on in the classroom
  - about anything related to education
  - about anything!!!
- send copies of messages to team members that pertain to their project and education to Janine for research purposes (joshelle@iastate.edu)
- prepare a group report concerning the progress of the project on the following dates
  - October 15
  - November 15
- submit the final group report to the National K-12 Foreign Language Resource Center by January 4, 1995

Complete copies of all reports will be sent to all New Technologies Institute participants.

### National K-12 Foreign Language Resource Center Project Guidelines and Deadlines

- Have access to a computer, modem, and email service (internet, America Online, CompuServe, etc.) by September 15.
- Send an email address to Janine by September 15.
- Check for email messages at least three times a week to assure regular communication with other participants.
- Send an email message to team members at least once a week.
  - About material directly related to the project
  - About what is going on in the classroom
  - About anything related to education
  - About anything!!!
- Cc (send by email) to Janine for research purposes copies of messages to group members that pertain to your project and education in general (joshelle@iastate.edu). The Center does not intend to be intrusive into your private life, but would like an idea of the type of message exchange that is taking place.
- Prepare a group report concerning the progress of the project to be received at the Center by the following dates:
 

October 15  
November 15
- Submit the final group report to the National K-12 Foreign Language Resource Center by January 4, 1995.

#### Email Addresses and Phone Numbers:

|                   |                       |              |
|-------------------|-----------------------|--------------|
| Marcia Rosenbusch | mrosenbu@iastate.edu  | 515-294-6699 |
| Janine Shelley    | joshelle@iastate.edu  | 515-294-6699 |
| Carol Ann Pesola  | capesola@vax.cord.edu | 218-299-3947 |
| Karen Willetts    | willetts@vax.mbhs.edu | 301-649-8235 |
| Helena Curtain    | hcurtain@csd.uwm.edu  | 414-358-0959 |
| Nancy Rhodes      | nancy@cal.org         | 202-659-5641 |
| Jim Becker        | becker@uni.edu        | 319-273-2367 |

## Letter Requesting Administrator's Support of Teacher's Post-Institute Project

October 30, 1994

Dear (Administrator

(Teacher's name) has been selected as one of twenty-three K-8 foreign language teachers from around the country to attend the Assessment Institute sponsored by the National K-12 Foreign Language Resource Center in Washington D.C.. Because a primary objective of this institute is to create ties among elementary foreign language teachers and college and university methods professors, (teacher's name) will be expected to use Email (electronic mail), requiring a computer and a modem, to collaborate with other Institute participants. Participants are expected to complete an Email cooperative project during the first semester, fall, 1994. Through Email (teacher's name) will also have access to foreign language educators and students across the US.

There have been several factors identified that affect the use of Email by educators: difficulty of use of the hardware and software, availability of hardware when needed, support of the principal, and external assistance when needed. The National Foreign K-12 Language Resource Center will train (teacher's name) in how to use Email and offer technical support when necessary. (Teacher's name) will need easy access to a computer (Apple, Macintosh, IBM, or DOS compatible), modem and phone line, and an Email account. We recommend America Online, \$10.00/month, because of its ease of use. We would appreciate your support of (teacher's name) as she takes part in this project.

If you have any questions, please call me at 515-294-6699.

Sincerely,

Janine Shelley  
Technology Coordinator  
National K-12 Foreign Language  
Resource Center

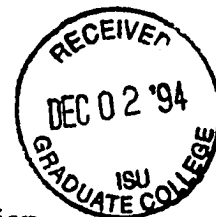
**APPENDIX H.**  
**IOWA STATE UNIVERSITY HUMAN SUBJECTS APPROVAL**

To: Dr. Pat Keith, Human Relations Committee Chair, 203 Beardshire

From: Janine Shelley, National K-12 Foreign Language Resource Center, 300 Pearson

Re: Addition to Information for Review of Research Involving Human Subjects

Date: December 1, 1994



This memo is being sent to assure that we have approval to use information collected from research done with participants of the National K-12 Foreign Language Resource Center 1994 summer institutes in a dissertation. There are no major changes from the original Human Resources form submitted 5/18/94 (attached).

Some minor changes are:

- a. "Thesis or dissertation"(first page: #5) should be checked. Please note on the third page use of data in a dissertation is mentioned: "These data may be used for a dissertation related to the new technologies initiative."
- b. Institute participants were requested to voluntarily send copies of messages exchanged with each other to the technology coordinator of the Center. They were informed during the summer institute that these messages would be used in research that would indicate the quantity and type of correspondence taking place. This is in addition to the "e-mail survey" mentioned on the third page.
- c. A final questionnaire that reflects the adoption, or lack of adoption, of the use of e-mail by participants will be developed and administered at the end of January, 1994. This questionnaire, like the others for this project, will ensure the confidentiality of data obtained. An example of the type of questions to be asked is attached.

Subject of the dissertation:

The purpose of this research is to study the factors based on Rogers' theory of diffusion of innovations that affect the implementation of the use of a communication technology, e-mail, by 86 foreign language educators who participated in four summer institutes presented at Iowa State University June-August, 1994. The e-mail training presented during the four institutes was designed around the factors that affect the implementation of an innovation.

*Approved  
P Keith  
12-2-94*



Janine Shelley  
9035 Clark Street  
Des Moines, IA 50325  
515-225-6026  
joshelle@iastate.edu



Date: August 21, 1995  
To: Committee on the Use of Human Subjects  
From: Janine Shelley

Re: Additional Research Procedures

I am requesting approval from your committee on a change in my research project called "National K-12 Foreign Language Resource Center".

In addition to the approved procedures, I wish to contact 81 non-participants of the institutes by questionnaire. Like the participants, they would be foreign language teachers. The subjects will be informed that their individual responses will be kept confidential.

Please find enclosed a copy of the proposed questionnaire.

Thank you

A handwritten signature in cursive script, appearing to read "Janine Shelley".

Approved  
P. Keith  
8-23-95

**Information for Review of Research Involving Human Subjects**  
**Iowa State University**

(Please type and use the attached instructions for completing this form)

1. Title of Project National K-12 Foreign Language Resource Center

2. I agree to provide the proper surveillance of this project to insure that the rights and welfare of the human subjects are protected. I will report any adverse reactions to the committee. Additions to or changes in research procedures after the project has been approved will be submitted to the committee for review. I agree to request renewal of approval for any project continuing more than one year.

Marcia Rosenbusch 5/18/94 Marcia H. Rosenbusch  
 Typed Name of Principal Investigator Date Signature of Principal Investigator

Foreign Language 300 Pearson 4-6699  
 Department Campus Address Campus Telephone

3. Signatures of other investigators Date Relationship to Principal Investigator  
Jan Sweeney 5/18/94 Evaluation Coordinator

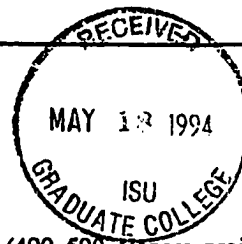
4. Principal Investigator(s) (check all that apply)  
☒ Faculty ☒ Staff ☐ Graduate Student ☐ Undergraduate Student

5. Project (check all that apply)  
☒ Research ☐ Thesis or dissertation ☐ Class project ☐ Independent Study (490, 590, Honors project)  
 Project Evaluation

6. Number of subjects (complete all that apply)  
100 # Adults, non-students     # ISU student     # minors under 14     other (explain)  
 (per funding period)     # minors 14 - 17

7. Brief description of proposed research involving human subjects: (See instructions, Item 7. Use an additional page if needed.)

See attached



(Please do not send research, thesis, or dissertation proposals.)

8. Informed Consent: ☐ Signed informed consent will be obtained. (Attach a copy of your form.)  
☒ Modified informed consent will be obtained. (See instructions, item 8.)  
☐ Not applicable to this project.